INDEX OF CONSERVATION DIVISION GUIDELINES

Item No.	Definitions, Laws, Regulations, Memoranda and other Guidelines with examples

VOL I

VOL II

OUTLINE FOR GEOLOGIC REPORTS ON PROSPECTING PERMITS, PREFERENCE RIGHT LEASE AND MINERAL LEASE APPLICATIONS

Assuming that the geologic report will be in the form of a memorandum, the type of application, land office case number, name of the applicant, county and state would be identified as part of the subject of the memo. The legal land description should be placed directly below the "subject". The body of the report is in three parts as follows:

I. For prospecting permit: (1) Statement as to the prospectively valuable character of the land and the (2) determination of existence, plus any further appropriate comment. Geothermal resources areas are to be specifically reported because of the new mining regulation. Preference right lease: Statement as to whether prospecting has proved the existence of a valuable deposit.

"It is recommended that the geologist's conclusion appear at the" first of the report for the convenience of those reviewing the application file.

II. Economic geology and other data which support the determination shown in part I.

(1) Geographic and physiographic description of the land as an aid to interpretation of the geology and prospecting recommendations. Not always necessary for a preference application.

(2) Discussion of the geology of the area with specific reference to economic aspects and possible geologic hazards. Enough detail should be given so that prospecting suggestions have some relevance

(3) Use the geology as previously stated to interpret the specific data necessary to determine existence. Use geologic interpretation and inference to make reserve or resource estimates.

III. Recommend to the regional mining supervisor the type of prospecting program required to determine existence or additional prospecting necessary to support a preference right lease applicati

Request notification from the regional mining supervisor as to when prospecting operations are underway plus review of incoming data fr the lessees and permitees, with the understanding that this information is proprietary. Such field contacts by our geologists and data reviews are fundamental in maintaining effective regional mineral land classification.

References cited or bibliography.

Gere and Renner, Sept 30, 1971

RECEIVED
JUL 30 1976
Conservation Division
U.S. GEOLOGICAL SURVEY
Office of the Area Geologist
Menlo Park, California

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

July 30, 1976

Memorandum

To: Area Geologist, Pacific Area

From: Acting Conservation Manager, Western Region

Subject: Coordination of geologic information for EA's and other lease management geologic report and review activities

In my memorandum of July 19, 1976, you were asked to arrange procedures between the District Geologist and your office to fully identify the geologic conditions and mineral resources of a given area in responding to an EA for an oil and gas exploratory well.

You are also asked to examine all of your lease management report and review activities to assure that all mineral values, including prospective, are being reported to the supervisors. Of course, clear listing responses to the BLM should be restricted to reporting lands in known leasing areas. We are relying on your staff to provide information and early alert to the supervisory personnel on potential multiple mineral use conflicts.

An instruction memo concerning procedures for reducing the potential for multiple mineral-use conflicts is being drafted. During the interim, please proceed as discussed above.

Your observations and comments on this matter will be welcome.

Hillary A. Oden

Hillary A. Oden

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

August 16, 1976

Memorandum

To: All Geologists, Office of the Pacific Area Geologist

From: Area Geologist, Pacific Area

Subject: Valuable prospectively statements in mineral reports requested by supervisors

We have been requested by the Acting Conservation Manager to include prospective values for all leasable minerals in our reports for the Geothermal and Mining Supervisors. Accordingly, you should include this information in all prospecting permit and preference right lease application geologic reports. You should also include this information in your input or review of EA's.

Henry L. Cullins

Henry L. Cullins

Attachment

cc: Dist. Geol., LA

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

August 31, 1976

Memorandum

To: Geologists, Office of the Pacific Area Geologist

From: Area Geologist, Pacific Area

Subject: Date of Mining Supervisor's request for mineral reports

The Acting Conservation Manager has requested that we mention the date of the Mining Supervisor's request when we prepare our reports on prospecting permits, lease applications, and our reviews of mining plans.

Please let us know if you anticipate any obstacle to timely response to any request from the Mining Supervisor.

Henry L. Cullins

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

September 16, 1976

Memorandum

To: Geologists, Office of the Pacific Area Geologist

From: Area Geologist, Pacific Area

Subject: Standard paragraph addition to geologic reports

In compliance with a request from the Acting Conservation Manager to include the requested date on geologic reports, the following paragraph should now be considered the opening and standard reply from this office:

> "The following geologic report on _____ permit application No. _____ is submitted in response to your request dated _____, and received by this office _____."

Henry L. Cullins

Henry L. Cullins

More Standard Paragraphs

Existence of (phosphate) resources is not known and additional prospecting will be necessary to ascertain the existence and workability of the deposit(s) in the permit area(s). Prospecting in these areas should involve both trenching and drilling. Trenching would aid in establishing both thickness and quality of the phosphatic zones. Drilling would prove the stratigraphic continuity of the phosphorite and confirm the reserves and grade determined by trenching.

Existence of (phosphate) resources is known, but additional prospecting will be necessary to ascertain the workability of the deposit in the permit areas.

Existence of a deposit in sufficient quantity and quality to indicate workability is known, and additional prospecting is not recommended.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

No. 44.1

September 26, 1967

Memorandum

To: Mining Engineer, Miami, Oklahoma

From: Chief. Branch of Mining Operations

Subject: Prospecting permit recommendations under Regulation 43 CFR 3220

According to Leo Saar this is still a valid doc. (10-14-76)

This is in response to your memorandum of September 11, stating that you cannot recommend a certain number of holes for preference right leases on hard minerals, such as lead-zinc, and including your former recommendations which are as follows:

> "To qualify for an extension beyond the two-year period will require at least one drill hole at a location and depth approved by Regional Mining Supervisor, or other comparable prospecting."

A preferable recommendation would be:

> "At least one test well shall be drilled during the initial term of the permit to such minimum depth as the Regional Mining Supervisor shall specify at the time his approval for prospecting methods and procedure thereunder is sought; or prospecting satisfactory to the Regional Mining Supervisor shall be completed or in progress for an extension. (see 3221.3 (a)), must show he has diligently performed prospecting activities on the land during the period.

The requirement for an extension is not to impose a hardship on the promoter, but to eliminate the speculator, who cannot, or does not expect to do anything except hold the land for trading purposes. Your former recommendations appear to have been satisfactory. However, suppose you have an isolated case where the permittee is required to build a road (costing $2,000 to $10,000) for access and starts drilling the 23-month, but does not complete the well during the initial 24-month period.

Such circumstances prevailing, the permittee should have an extension. It is believed that the foregoing suggested revision will give sufficient leeway to recommend an extension when warranted.

The Regulation 43 CFR 3221.4 does not specify any particular type of prospecting as a reward for discovery, but subsection (a) states, "Upon discovery of any valuable deposit of minerals the permittee shall be entitled to a preference right lease for the mineral in any or all of the lands in the permit..."

J. D. Turner

NOTE: It is requested that you, or Dinsmore, bring this subject up for discussion at the Supervisors' Conference in Denver October 30, 1967.

cc:
Anchorage
Billings
Carlsbad
Denver
Eastern
McAlester
Rock Springs
Salt Lake City

GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

Conservation Division
U.S. GEOLOGICAL SURVEY
Anchorage, Alaska

According to L. Saarela 10-14
this is still a valid document

April 3, 1969

Memorandum

To: Regional Mining Supervisor, Anchorage
Billings
Carlsbad
Denver
Washington, D.C.
McAlester
Salt Lake City

Regional Geologist, Washington, D.C.
Anchorage
Denver
Los Angeles
Great Falls
Roswell
Tulsa
New Orleans

Through: Chief, Branch of Mining Operations
Chief, Branch of Mineral Classification

From: Chief, Conservation Division

Subject: Report by District or Regional Geologist to Regional Mining Supervisor on prospecting permit applications

Apparently there is still some confusion as to the procedure involved in handling the subject applications, as presented in Conservation Division Manual 671.5.3A and B.

A brief elaboration of these procedures would be as follows:

(1) The geologist, upon receipt of a copy of the serial register sheet, should also request, receive, and review all pertinent information from the case files of the Regional Mining Supervisor for reference in preparation of his geologic report.

(2) The geologist should utilize all additional geologic information available from any reliable source. He should also make a spot field investigation if he decides it is necessary. It is the geologist's responsibility to:

(a) establish whether or not existence is known, and

(b) if existence is known, to provide any additional geologic data of value to assist the Supervisor in making a workability determination, or

(c) if existence is not known, to indicate the minimum exploration requirements likely to be necessary to establish existence.

(3) The geologist is to report these findings to the Supervisor with a copy to the Chief, Branch of Mineral Classification. He should clearly tell the Supervisor whether or not existence is known or not known. He should not recommend that a competitive lease should issue on the basis of existence only.

(A) If existence is known, the question of permit or lease will still depend upon the Supervisor's determination and the Division Chief's decision regarding workability. The geologist's report will establish that existence is known and also furnish geologic data of value to the Supervisor in determining workability.

(B) If existence is not known, the geologist's report to the Supervisor will inform him of this fact and also indicate the minimum exploratory requirements likely to be necessary to establish existence.

One purpose of the geologist's review of all geologic data and related factors is to save the time and effort of the Supervisor in searching through geologic literature and in compiling resource data on the area under application. The review will also be of great value in the event of an appeal.

Russell G. Wayland

Russell G. Wayland

United States Department of the Interior

OFFICE OF HEARINGS AND APPEALS

INTERIOR BOARD OF LAND APPEALS

4015 WILSON BOULEVARD

ARLINGTON, VIRGINIA 22203

STANFORD R. MAHONEY

IBLA 72-412 Decided August 24, 1973

Appeal from the decision of the Bureau of Land Management's Utah State Office rejecting phosphate prospecting application Utah 12759.

Routing 9/17/73 Date

SD

ASD

RCS

OTA

Set aside and remanded.

Environmental Quality: Generally--Mineral Lands: Prospecting Permits--National Environmental Policy Act of 1969: Environmental Statements

> Where a technical examination has established that phosphate prospecting operations, if conducted under appropriate permit stipulations, would not have any significant impact on the environment, but it is feared that if the prospecting resulted in the discovery of commercial deposits damage to the important watershed might result from actual mining operations, the prospecting permit may be allowed subject to the express condition that no preference right lease will issue until and unless an environmental impact analysis, accomplished in accordance with the National Environmental Policy Act of 1969, indicates that the ore can be successfully extracted without significant adverse environmental effect.

Also for COO

Mineral Lands: Prospecting Permits

Except in cases where knowledge of the mineralization is so conclusively established that the failure of a prospecting venture can be anticipated with near absolute assurance, it is error to deny

GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

DEC 4 1973

Memorandum

To: Area Mining Supervisors

Through: Regional Conservation Managers

From: Chief, Conservation Division

Subject: Guide for stipulations in prospecting permits

A memorandum on this subject dated June 24, 1969, from the Chief, Branch of Mining Operations, contained recommendations for stipulations relating to discovery requirements that entitle a permittee to qualify for a preference right lease. Under the Mineral Leasing Act of 1920 and 43 CFR 3520.1-1, it is not appropriate to require a discovery "in commercial quantities" for minerals other than coal. Therefore, the following revised stipulations should be used in the future.

Coal

N/A To qualify for a preference right lease for all or part of the land, the permittee must drill at least (number) adequate test holes or perform comparable prospecting in accordance with the approved plan for exploration and make a discovery of coal in commercial quantities satisfactory to the Area Mining Supervisor.

Sulphur, Sodium, Phosphate, Potassium, and Hardrock Minerals

To qualify for a preference right lease for all or part of the land, the permittee must drill at least (number) adequate test holes or perform comparable prospecting in accordance with the approved plan for exploration and make a discovery of a valuable (specify type of mineral) deposit satisfactory to the Area Mining Supervisor.

The approved plan must be designed to show information about the existence and workability of the deposits, which, if the Government had such information when the permit application was filed, would have required rejection of the application.

(ORIG. SGD.) JOHN DULETSKY

ACTING Chief, Conservation Division

cc: OCCD
Regional Conservation Managers
CD
Mining (620)

WCSheldon:jlc:12/4/73

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

August 24, 1976

Memorandum

To: Area Mining Supervisor, Alaska-Pacific Area

From: Acting Conservation Manager, Western Region

Subject: Unnecessary delays in responding to BLM requests for reports on prospecting permit applications

I am concerned about some recent cases that have required several months to a year from the time of receipt to the preparation of your recommended response to the BLM request. Much of the time delay should be avoidable, and this office will attempt to provide assistance to aid you in reducing time.

For tracking purpose, the following procedure is to be followed beginning immediately:

1. Upon receipt of a prospecting permit application, a copy of the BLM request for a report is to be forwarded to this office with a notation of your estimated response time.

2. Immediately on receipt of the BLM request, the Area Geologist should be requested to report his findings and recommendations, advising him of any special particulars on which you wish his detailed recommendations and comments.

3. The Area Geologist is to submit his report within 30 days of receiving your request or advise you of any reason or problem for needed time to respond to your request. A copy of such a notification from the Area Geologist is to be furnished to this office.

4. Any potential multiple-mineral use conflicts should be noted early, this office advised, and the Oil and Gas or Geothermal Supervisors, if involved, requested to furnish a factual report and recommendations.

In addition, please furnish us with a listing of all BLM requests for report that you are now holding, showing the date received and, if re-

tained over 60 days, why a response memo has not been prepared. May we have this listing by September 7, 1976. It is noted that information concerning pending permits is tabulated in your monthly report, but not in sufficient detail to allow adequate tracking of progress.

We believe the response time to the BLM requests should not be more than 60 to 90 days except in unusual cases or circumstances. We also believe such a goal is attainable through mutual effort and support.

Your comments and suggestions are welcomed.

F. J. Schambeck

Fred J. Schambeck

cc: Area Geologist, Pacific Area

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

October 13, 1976

Memorandum

To: Acting Conservation Manager, Western Region

From: Area Mining Supervisor, Alaska-Pacific Area

Subject: Prospecting Permit Application Routing

Response is made to your request for background data on the routing of and requirements in prospecting permit applications during our October 7 meeting. Attached is a copy of the Division Chief's instructions of April 3, 1969, for the purpose of the District or Area Geologist's report to be furnished the Mining office. So far as I know, the instructions still stand. The second letter from the Chief, Branch of Mining Operations, outlines the thinking behind the drilling requirements required for an extension.

As you know, the initial requirement of reporting to the BLM on an application was a relatively simple process with the Mining Supervisor assembling the data for the Director's signature, with cooperative involvement of the Mineral Evaluation geologists. With the expansion of Mineral Evaluation, it was deemed essentially mandatory to secure the geological report as explained by Wayland's instruction. The attempts to fine tune the discovery/existence/workability have continued attempting to further define the constantly changing notions of a leasable deposit.

With the new regulations outside the EMARS coal program, it appears that BLM should be requesting an initial geological report from the Area Geologist to make a first appraisal for the permitting/leasing decision and then later the 43 CFR 23 examination should be participated in by the Mining representatives with the BLM to iron out the exploratory and other conditions.

called Leo He would like to contact directly

Until it has been determined that the responsibility should be relegated to the field or until other instructions are received, it appears that, for the sake of consistency, the old system should be followed; otherwise, if they were forwarded from your office, they would not be approved in Reston anyway.

Comments from the field will be forwarded when received and if anything else is required, please advise.

L. H. Saarela

Attachments

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

March 10, 1977

Memorandum

To: All Geologists, Office of the Pacific Area Geologist

From: Area Geologist, Pacific Area

Subject: Prospecting permit application reports

The publication of revised mining regulations and discussions with the Acting Conservation Manager and Mining Supervisor require that this office modify procedures for replying on prospecting permit applications to eliminate wasted effort and to ensure processing of applications in a timely manner.

The questions that BLM ask when they send a prospecting permit application to the Survey are:

1. Is existence of the leaseable mineral known?
2. Is the deposit workable?

We can answer the first question by replying that:

1. The application is in or includes a Known Leasing Area.
2. Existence is known.
3. Existence is not known.

If an application is in a Known Leasing Area, we need only so state and include an illustration showing the leasing area and the application.

In order to say that existence is known we must have enough information to calculate measured, indicated and inferred reserves. We should give this information and all other necessary geologic information to the Supervisor so that he may make a determination of workability.

If existence is not known, then it is proper that the prospecting permit should issue. No further geological information is necessary at this point. Only one application in five issues so four reports in five are wasted effort and their preparation delays timely processing of all applications.

Concerning that one application in five that may issue, it is important that the Supervisor should be aware of any potential multiple mineral conflicts at this time so that he can arrange with the Oil and Gas and/or the Geothermal Supervisor for appropriate stipulations in the permit. The geologist processing an application will, in addition to making his existence determination, determine if there are any indicated potential multiple mineral conflicts. This determination can be made either by requesting BLM to provide a copy of their land use plat of the affected area for his inspection or by requesting BLM to check their land use plat and to report their finding to us by telephone. If there are no potential conflicts he should so state. If there are any, he should report the lease, permit or application number and mineral involved and prepare an illustration showing the lands involved. Information concerning locatable minerals should be reviewed and reported. BLM use-plats will include claims recorded under their new "organic act." We plan to acquire all BLM use-plats on aperature cards so that this part of the process can be handled in our office.

The next step after BLM receives the Survey's reply on existence and workability is a joint inspection arranged by BLM. We should make every effort to participate in these Technical Examinations to familiarize ourselves with the local geology, identify geological hazards, and meet the potential operator to discuss his proposed exploration and operation. We should prepare for maximum geological input to the supervisor and involvement in review of exploration plans and plans of operations required <u>after</u> a permit issues.

Henry L. Cullins

AUG 0 2 1977

M-36893

THE EFFECT OF MINING CLAIMS ON SECRETARIAL AUTHORITY TO ISSUE PROSPECTING PERMITS FOR COAL AND PHOSPHATE

Coal Leases and Permits
Permits: Generally

A prospecting permit for coal cannot be issued for land subject to a claim. If a prospecting permit for coal purports to cover land subject to a mining claim, it is invalid as to that land. Consequently, in demonstrating a discovery of coal in commercial quantities in land subject to a prospecting permit, the permittee must exclude coal in land covered by a mining claim.

Phosphate Leases and Permits
Permits

A prospecting permit for phosphate cannot be issued for land subject to a claim. If a prospecting permit for phosphate purports to cover land subject to a mining claim, it is invalid as to that land. Consequently, in demonstrating a discovery of a valuable deposit of phosphate in land subject to a prospecting permit, the permittee must exclude any phosphate in land covered by a mining claim.

Multiple Mineral Development Act
Generally

The Multiple Mineral Development Act did not amend the Mineral Leasing Act to authorize the issuance of prospecting permits for coal which cover lands subject to mining claims.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

May 19, 1977

Memorandum

To: District Mining Supervisor, Pocatello, Idaho

Through: Area Geologist, Pacific Area
Area Mining Supervisor, Alaska-Pacific Area

From: Geologist, Menlo Park

Subject: Geologic Report, Aquired Lands, Uranium Permit Applications I-12607 and I-12608, St. Joe American Corporation

This geologic report is in response to your request dated March 8, 1977 and received by this office April 5, 1977.

The applications for uranium prospecting permits I-12607 and I-12608 on aquired lands cover 2,453.74 and 2,533.98 acres respectively in T. 55 N., R. 3 W., Boise Meridian, Idaho. A legal description of the lands is given in the application. The applicant also holds uranium claims on adjoining National Resource lands and leases on fee lands.

The area is not prospectively valuable for any of the leasable minerals under the leasing or aquired land laws.

Aquired lands in sec. 22, 27, 28, and 34 have previously been held under uranium prospecting permits I-07320, I-07339, I-07349, I-07375, and I-07386. All permits have since expired.

The area lies in mountainous, moderately to heavily timbered terrain with local relief of over 400 ft. Topography is shown on the 7.5 minute Careywood topographic map. (U.S. Geol. Survey, 1968). State highway 95 and major rail lines both east and west of the subject area provide transportation into the region. Secondary roads and jeep trails are numerous in the subject area. The area is bordered by Hoodoo Valley on the west and northwest and Pend Oreille River on the east.

Geology

The geology of the area has been mapped by Sandra Clark as part of an unpublished Ph.D. requirement for the University of Idaho. The application area is underlain by the Tertiary Cocolalla quartz monzonite intrusive complex. The Cocolalla complex consists of equigranular to porphyritic zones of muscovite to biotite rich quartz monzonite. Pleistoncene and Tertiary alluvium cover the Hoodoo and Pend Oreille River Valleys. Roof pendants of the Prichard Creek Formation border the area to the east. Glacial erratics are located throughout the subject area. Autunite, a hydrated phosphate of calcium and uranium has previously been reported from sec. 27, and 34, T. 55 N., R. 3 W., B.M., Idaho by the Atomic Energy Commission in a preliminary reconnaissance report dated May 24, 1956. The autunite was described as occurring along fractures and as surface coating. (Autunite is derived from the alteration of uraninite or other uranium minerals). The AEC report concluded that there was insufficient autunite to be of commercial value. A radioactivity of 0.01% U_3O_8 was noted.

Preliminary reports No. 2 and 3 by the Idaho Bureau of Mines and Geology also described the subject area as the former Halliwill prospecting permit area in secs. 27, and 34, T. 55 N., R. 3 W. Autunite, associated with possible hydrothermal alteration was noted in section 27. High radioactive counts were measured in prospecting pits where joints and alteration were prominent. Up to 0.05% U_3O_8 were calculated for the area. The findings in sec. 34 were summarized in Prel. Report No. 3 as "very low grade". The area in sec. 27 was summarized in report No. 2 as low grade with some possible potential due to the hydrothermal alteration.

While field checking the application area on May 10th, 1977, visible lemon-yellow platy autunite crystals were noted in fractures along shear zones of the quartz monzonite in NE¼NW¼ sec. 27, T. 55 N., R. 3 W. Readings of up to 1600 cps were measured with a scintillometer.

Available water quality studies from streams in the application area and surrounding region show anomalous high readings of 50 to 230 parts per billion U_3O_8. Average content of U_3O_8 in water is 4 ppb.

Based on the available published and other geologic data, there is insufficient evidence to determine the existence of a known deposit of uranium. Although there are isolated occurrences of uranium-bearing minerals, prospecting is recommended to establish existence of a workable deposit of uranium within the meaning of 43CFR 3520.

Prospecting activity for uranium may include a detailed mapping program. soil and water sampling, airborne spectrographic surveys, and a Track Etch study which consists of 1.5 ft deep hand augered holes spaced from 30 to 1000 meters apart in which radon detection devices are placed for a period of about 3 weeks. The holes can then be properly backfilled after use. Off-road vehicular traffic is not necessary as there are already numerous logging roads and trails in the area.

Follow-up prospecting in promising areas may include air-percussion or rotary drill holes in which radiometric profiles are run. Trenching for better rock exposure and surface sampling may be desirable in selected areas.

Peter Oberlindacher

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
STATE OFFICE
Federal Office Building, Room E-2841
2800 Cottage Way
Sacramento, California 95825

Memorandum

FEB 23 1976

To: Director (210)

From: State Director, California

Subject: Proposed rule making 43 CFR 3520.

The purpose of these regulations is to clarify and establish the conditio under which certain leasable mineral permittees shall be entitled to a preference right lease.

In essence the doctrine of "discovery" is being applied. This principle applied to issued permits may solve the problem of when to issue a preference right lease, but the following clarifications are necessary.

1. A clear distinction between this criteria and the principle when advising BLM that a competitive sale is inorder under or a prospecting permit can issue, and

2. A clear distinction between the discovery doctrine and the principle used when USGS advises BLM that the lands are "known to be valuable for minerals subject to disposition under the Mineral Leasing Act" so BLM can apply the rules of PL-585.

It is our view that the words or phrases, "valuable for," "mineral in character," "known to be valuable for minerals subject to disposition under the Mineral Leasing Act" as applied to leasing act minerals include lands which from geologic indications warrant "prospecting" operations to establish the actual existance of deposits specified in the 1920 Act.

Unless the regulations limit the discovery doctrine to only the preferenc right situation, we are going to increase the present dilemma on mineral classifications for lea[illegible] minerals.

Ed Hastings

cc: Solicitor (Riverside
USGS (Menlo Park, [illegible]) Regional Conservation Mgr.
Director (720)

news release

Office of the Secretary

For Release February 23, 1976

KLEPPE ISSUES INSTRUCTIONS FOR ORDERLY IMPLEMENTATION OF NEW REGULATIONS

Secretary of the Interior Thomas S. Kleppe has instructed Interior officials to approve no pending federal coal preference right lease applications, until final publication of the Department's regulations defining what constitutes commercial quantities.

Under the proposed regulations, a preference right lease can be granted only after a determination by the U. S. Geological Survey (USGS) that the applicant has demonstrated coal exists on the proposed lease area in commercial quantities (in adequate amounts and so located as to provide a margin of return after all operating costs, including: opening the mine; removing the coal; processing; transportation; royalty payments; and, compliance with regulations, lease terms, and reclamation and environmental standards).

Kleppe said only applicants that previously had made a satisfactory showing of commercial quantities to the (USGS) and the Department Solicitor under the old standards could be considered prior to finalization of the regulations. According to (USGS), only one of the 192 pending applications--that of Rosebud Coal Sales Co. for a lease in Sweetwater County, Wyo.--previously had made a satisfactory showing. If the proposed new commercial quantities test is met by Rosebud, a determination will be made that either the lease can be issued forthwith, or will be held pending completion of a regional environmental impact statement (EIS) for Sweetwater County. The Bureau of Land Management (BLM) earlier was directed to prepare a regional EIS for Sweetwater County. The other 191 pending applications would have to be re-examined under the new standards when they are final, and (BLM) has estimated that of these, only about 55 of the applications would be able to meet the proposed tests.

The period for public comment on the proposed regulations has been extended for 30 days, until March 19.

Secretary Kleppe said that once the final regulations have been published, the BLM must contact all preference right lease applicants and advise them of the priority the Department will utilize in processing existing applications.

He said he had further instructed the BLM to prepare procedures and guidelines to assure that Western Governors are consulted prior to the issuance of any preference right leases. Most known federally-owned coal deposits are located in the public land states in the West.

In January and, in October, Kleppe stated that a new federal coal leasing policy would be implemented under controlled conditions. He said it will be a locally competitive leasing system.

The Secretary advised that despite his having announced the new leasing policy, it could be as much as 12 to 18 months before the first competitive lease would be granted. However, he noted that he did expect some of the already pending preference right lease applications would be approved during the interim.

Under the Department's new coal leasing policy, no new coal prospecting permits will be issued, and no further preference right lease applications will be accepted following resolution of those that may be submitted under 28 existing prospecting permits.

The 192 preference right lease applications cover an estimated 9.3 billion tons of recoverable coal reserves in the six western states of Montana, Wyoming, Utah, Colorado, New Mexico and Oklahoma. More than six billion tons of this is surface mineable and about four billion of these are in Wyoming. An additional estimated three billion tons of coal are covered by the 28 prospecting permits in the same six states.

x x x

[illegible] and jeopardize the safety and well being of informants, witnesses and their families and law enforcement personnel and [illegible] investigative techniques, sources and methods used by this component and could result in the invasion of the privacy of individuals only incidentally related to an investigation.

The exemption of the individual's right of access to his records and the reasons therefor necessitate the exemption of this system of records from the requirements of the other cited provisions.

[FR Doc.76-12337 Filed 5-6-76;8:45 am]

Title 43—Public Lands: Interior

CHAPTER II—BUREAU OF LAND MANAGEMENT

PART 3520—PREFERENCE RIGHT AND COMPETITIVE LEASES

Prospecting Permits; Issuance of Leases

On January 19, 1976, proposed regulations were published in the FEDERAL REGISTER (41 F.R. 2918), to formally define "commercial quantities" under 30 U.S.C. 201(b) and "valuable deposit" under 30 U.S.C. 211(b), 262, 272, and 282 and to state what information the permittee must submit to demonstrate the existence of coal in commercial quantities or of a valuable deposit of the other permit minerals, and to state that if a permittee makes the necessary showing, the Secretary will offer a lease to the permittee. Initially, interested persons were given until February 19, 1976 to submit comments; the comment period was later extended until March 19, 1976. 41 F.R. 7[illegible] (1976). Full and careful consideration was given to all written comments received and in response to these comments several changes have been made in the regulations.

Many of the comments received were critical of the standard for commercial quantities and valuable deposit contained in the proposal. Nevertheless because of the law's requirements, the Department has not changed the essential aspects of the proposed rules, although several revisions have been made.

Major Change. The proposed regulations required the permittee to submit information on the cost of mining without first being informed of proposed lease terms and royalties. Several of the comments noted that this would be burdensome and unfair to lease applicants and that lease terms should be known to the permittees before they have to present financial information. The Department agrees that the procedures in the proposal would have created this problem. In response, the Department has divided the application procedure into two phases. In the initial phase, the applicant will submit reserve information, describe the physical characteristics of the area covered by his permit and describe his proposed mining operation. 43 CFR 3521.1-1(b). The Department will use the information to do a technical examination/[illegible] of the area cov[illegible] [illegible] of this step is to prepare appropriate lease terms and stipulations. 43 CFR 3521.1-5. The proposed lease terms and stipulations will be given to the permittee, and based on this information he [illegible] of company and [illegible] 3521.1-6). The Department believes that this procedure is fair to the lessee and complies with the Department's duty to assure effective environmental protection.

The Department realizes that the information that the permittee submits on proposed mining methods, mine location and proposed schedule of mining will have to be somewhat general, and that, often, additional drilling and planning will be required before final mining plans can be completed. Nonetheless, the permittee must make an estimate of the methods of mining and the location of the mine. At a minimum, this requires identification of the proposed mining method (underground or surface), the likely rate of production, the location of the mine and basic mining and processing equipment and other factors. Information more detailed than that based on drilling information necessary to demonstrate the existence of measured or indicated reserves is not required. Subsection (a) of 3521.11 has been amended to allow additional time for the filing of the initial application.

Minor revisions and response to comments. The Department has made several changes of a minor nature in response to comments on particular sections. These are addressed in the following section-by-section analysis. Explanation of why changes were not made is also included in this analysis. The comment is listed followed by the section involved and Department's response.

1. Request that the regulations apply to coal only. 3520.1-1(a). This section says that the regulations will apply to all prospecting permit minerals. The Department believes that the regulations state the proper standards for all permit minerals and that delay in applying the standard to those minerals would serve no purpose

2. Request that Department apply "workability" standard/request that Department apply "overall balance" standard. 3520.1-1(c). This section adopts the prudent person rule to determine whether a permittee has discovered coal in commercial quantities or a valuable deposit of one of the other permit minerals. The Department has reviewed in great detail the legal support for each of the positions suggested by the comments and has concluded that the standard found in the regulations correctly interprets the Mineral Leasing Act and other relevant statutes. Consequently, the definition in the proposal has not been changed. One comment requested that the Department adopt the prudent person test, without its marketability aspect. This comment fails to recognize that the prudent person standard and the marketability standard are not different tests. As the Supreme Court [illegible] the prudent-[illegible] the marketability tests are not distinct standards, but are complementary in that the latter is a refinement of the former." 390 U.S. 599, 603 (1968).

3. Request that this standard not apply to permits granted before the effective date of the regulation. 3520.1-1(d). This section stated that the regulation would apply to applications for leases pending on the effective date of the regulation. The Department has full legal authority to adjudicate pending applications for leases under the standards adopted by these regulations. As a question of policy, it has determined that the public interest would not be fully protected unless these applications for leases are examined under what the Department believes is the correct interpretation of the statute. Conversely, the Department believes that it would be extremely disruptive and not in the public interest to examine leases issued prior to the promulgation of this regulation to determine if, when issued, they complied with the standards of this regulation. In addition, the Department believes that there would be extremely difficult problems of proof if this inquiry were made. Consequently, this section has not been changed.

4. Request that the Department give lease terms to permittee before a financial showing is made. 3521.1-1(b). This comment was discussed previously in the section on major changes. In response to this comment, 3520.1-1(b) was made into two subsections 3520.1-1(b) and 3521.1-1(c). In addition, two new sections were added, 3521.1-4 and 3521.1-[illegible] to explain the steps the Department will take to prepare lease terms and stipulations.

5. Request clarification of application to in situ development or utilities. 3521.1-1(b), now 3521.1-1(c). This section refers to the cost of operating or developing a "mine." Several comments requested that additional language be added to insure that "mine" encompasses in-situ development. The Department intends and believes that the term "mine" is sufficiently broad to take into account all types of coal development, including in-situ development. The regulation states that all estimated costs must be taken into consideration, and then sets out a list of costs. The Department intends that the list should not be considered the exclusive list of costs, and other costs are appropriate because of the type of development these costs must be identified. The Department used the word "included" to indicate that the list was not an exclusive list. Similarly, for integrated coal users, such as utilities, who both mine and use the coal, they will be required to place a value on the coal used and on the cost of mining the coal. Since the original language is broad enough to cover this comment, no change was made.

6. Request for clarification of time to determine prices and costs. 3521.1-1(b) now 3521.1-1(c). The proposed regulation did not state whether the prices and costs should be determined [illegible] of application, time of [illegible] other time. While the Administrative Act clearly limits the time to collect in

formation on the physical property of the coal deposit to the term of the prospecting permit, no such limitation appears for prices and costs. The basic purpose of prudent person test is to give an ation of whether a particular lease can be developed. In view of the purpose of the test, the Department believes that prices and costs should not be frozen at the time that the application for lease is filed. The Department will administer the regulations to consider, where appropriate, price changes that occur before a final Departmental decision is made. Expected prices and costs over the life of the deposit may be considered.

7. Request for clarification whether a contract for the sale of the mineral is needed to prove revenues. 3521.1-1(b)(2), now 3521.1-1(c)(1). This section requires the permittee to estimate revenues. The Department recognizes that in many instances a contract to sell coal cannot be signed until after a lease is awarded. While an executed contract will usually be the best evidence of revenues, estimated revenues may be based on factors such as price received for similar coal, evidence of existing markets or the applicant's best judgment of future markets. Lack of a contract will not disqualify a permittee from receiving a lease.

8. Request for clarification whether costs includes cost of complying with state regulations. 3521.1-1(b)(3), now 3521.1-1(c)(2). The proposed section stated that all "direct costs" would be considered. Several comments noted that meaning of "direct" was unclear, and ny rate it would eliminate costs that a prudent person would consider. The Department agrees with both of these comments and has eliminated the word "direct." This change, plus the use of "including" before the list of the costs, should make it clear that the permittee must show all costs. The costs of complying with state or local government regulations are clearly costs that must be considered.

9. Request that the permittee estimate the cost of complying with yet unenacted laws. 3521.1-1(b)(3), now 3521.1-1(c)(2). This section says that the permittee must show the cost of complying with "existing" governmental regulations. It is alleged that a prudent person would consider not only the cost of existing regulations, but also the cost of future regulations. The Department believes that such considerations are generally inappropriate in this context, since these costs are too remote to be reasonably estimated. Consequently this section was not changed.

10. Request that the willingness of the permittee to sign the lease be accepted as evidence that the prudent person test has been met. 3521.1-1(h). This section requires the authorized officer to review the information and determine that a satisfactory showing has been made. The Department has not changed this section for two reasons. First, the Department [illegible] the Mineral Leasing Act [illegible]uires the Department to review the permittee's showing. Second, the prudent person test is an objective, not a subjective test. The question under that test is not whether a particular person would invest his labor and means, but whether an objective prudent person would do so.

11. Request that rental rate be raised. 3521.1-1(e) now 3521.1-1(f). This provision requires the initial application to be accompanied by the minimum rental permitted by the Mineral Leasing Act. The comment requests that the Department charge higher rentals. The Department's position is that, at the application stage, it is appropriate for the permittee to submit only the minimum rental. This minimum charge does not preclude the Department from charging a higher rental in the lease.

12. Request for clarification whether imposition of lease terms could result in a deposit failing to meet the statutory test. 3521.1-1(f), now 3521.1-5. This section, as revised, requires the Department to prepare appropriate lease terms before the permittee submits financial information. The costs imposed by these stipulations are considered in the same manner as all other costs. If the cost of mining exceeds the value of the deposit, the lease application will be denied; the source of the costs will not be separately examined.

13. Revise hearings procedures to clarify when permittee has a right to a hearing. 3521.1-1(i), (j), now 3521.1-1(j). The proposed hearing procedures did not clearly state when a permittee had a right to a hearing. The two sections have been combined and the regulation now says that a permittee has a right to a hearing if he has alleged in his application facts sufficient to show that he is entitled to a lease. The revised regulation still provides that the permittee has both the burden of going forward and the burden of proof.

General Comments. The Department also received several comments that were not directed to a particular section of the regulations.

1. Request that regulations include specific right to judicial appeal. Since the right to appeal is covered by the Administrative Procedure Act, the Department does not believe it is necessary for the regulations to include a judicial appeal section.

2. Request for explanation of relationship of Endangered Species Act and these regulations. Where necessary, the Department will include stipulations in mineral leases that require lessees to comply with the provisions of the Endangered Species Act, 16 U.S.C. 1531-43. Since these rules require that the cost of all stipulations be included in the commercial quantities and valuable deposits determination, it is possible that stipulations to comply with the Endangered Species Act could result in a lease application not meeting the requisite test. The lease application would then be denied under the Mineral Leasing Act. In other situations, where the lessee will be able to modify his operations to meet the requirements [illegible] Species Act, and [illegible] the Mineral Leasing Act, the lease wi[illegible] be offered.

3. Request to change "Secretary" t[illegible] "authorized officer." The proposed regulations referred to "Secretary" to designate an official of the Department. Several comments noted that the term "authorized officer," as defined in 43 CF[illegible] 3000.0-5(f), should be used instead. Th[illegible] Department agrees and has change[illegible] "Secretary" to "authorized officer" t[illegible] make these regulations consistent wit[illegible] other regulations of the Department.

4. Request for preparation of inflationary impact statement. The Department has prepared a negative declaration to meet its responsibility under E.C[illegible] No. 11821.

5. Allegation that regulations are inconsistent with Mining and Minerals Policy Act of 1970, 30 U.S.C. 21a. The Department believes that these regulation[illegible] fully promote the purposes of that Act. For example, the Act establishes a policy of fostering and encouraging private enterprise in the development of "economically sound" and stable mining industry 30 U.S.C. 21a(1). Reviewing whether a permittee has a prospect of success i[illegible] developing a valuable mine supports thi[illegible] principle.

6. Requests for clarification whether new prospecting permits will be issued for coal. On January 26, 1976, Secretary Kleppe announced that, in the near future, no new prospecting permits would be issued for coal. Permit programs for other minerals will continue.

7. Request for discussion of relationship betwen these regulations and competitive leasing under the Mineral Leasing Act. These regulations do not change in any way, the administration of the competitive leasing aspects of the Mineral Leasing Act.

8. Request that the Department exercise in these regulations its authority to ensure the sale of the production from the leased lands at reasonable prices. 30 U.S.C. 187. The Department does not feel it is proper to incorporate in these regulations, a procedure to review whether prices are reasonable.

9. Request whether information submitted by permittee will be treated as confidential information. The Department will treat information submitted under these regulations according to the Freedom of Information Act procedures in 43 CFR Part 2.

10. Request that "chiefly valuable" standard be omitted. Several comments expressed disagreement with the requirement that before a lease could be issued to a permittee who was prospecting for sodium, sulphur, or potassium, 3521.1-1(c), now 3521.1-1(d), the permittee has to show that the land is "chiefly valuable" for the mineral deposit. The Department has no discretion to dispense with this requirement for these three minerals because the Mineral Leasing Act requires the showing to be made. 30 U.S.C. 262, 272, and 282. Because of the large number of comments on the "chiefly valuable" standard, the Depart[illegible]

[illegible]nition of the term. Comments received in advance of that proposed rulemaking will be [illegible]sidered to the extent possible. Com[illegible] should be directed to the Director, [illegible]eau of Land Management (210), Department of the Interior, 18th and C Streets, N.W., Washington, D.C. 20240. The anticipated publication date for this proposed rulemaking is September 1, 1976.

11. Request that the standard of valuable deposit not apply to hardrock prospecting permits. The proposed rulemaking applied not only to prospecting permits issued under the Mineral Leasing Act, but also to permits issued under the authority transferred to the Department of the Interior by Section 402 of the Reorganization Plan No. 3, 60 Stat. 1099. The Department's authority under the Reorganization Plan does not require the Department to use any particular leasing system or standard. In the past, the Department has used the same standard under the Reorganization Plan as it used under the Mineral Leasing Act. Consequently, prospecting permits issued under the Reorganization Plan were included in the proposed rulemaking. However, the Department is presently considering whether to adopt a different system for leasing minerals subject to the Reorganization Plan. Consequently this rulemaking does not include permits issued under the Reorganization Plan. The Department intends to undertake separate rulemaking for minerals leasable under that authority. Comments should be di[illegible]ed to the address listed in the prev[illegible] response. No proposed date of publication has been established.

12. Request that the Department provide existing lease applicants with access to the permit area to allow them to gather information required by these regulations. Several comments noted that a permittee whose permit expired before the effective date of these regulations will have no opportunity to gather information needed to comply with the regulations. Although these regulations require no more drilling than was previously properly required, in recognition of this potential problem (and in recognition of a similar need of a potential bidder under the Department's competitive leasing procedures), the Department is preparing regulations that allow cooperative drilling and testing of federal mineral deposits. Information obtained under a cooperative testing agreement could be used to prepare a preliminary mining plan, but could not be used to show either the quantity or quality of the mineral for the purposes of showing entitlement to a lease; under the Mineral Leasing Act, that information must be obtained during the term of the permit.

Administrative matters. After the final promulgation of these regulations, the Bureau of Land Management will contact all preference lease applicants and inform them of the new regulations, and offer them an opportunity to submit ad[illegible] of the regulations. The Bureau of Land Management will also inform the permittees that applications for leases which meet the Department's short-term leasing criteria will be processed first.

Therefore, under the authority granted under § 32 of the Mineral Leasing Act, 30 U.S.C. 189, 43 CFR Subparts 3520 and 3521 are amended as follows:

1. 43 CFR Subpart 3520 is amended by revising § 3520.1-1 to read as follows:

§ 3520.1-1 Preference right leases.

(a) *Coal, phosphate, sodium, sulphur, and potassium* (1) The authorized officer shall issue a lease to the holder of a prospecting permit issued for phosphate, sodium, sulphur, or potassium if the permittee shows to the authorized officer that, within the term of the permit, he discovered a valuable deposit of the mineral for which the permit was issued, or for a prospecting permit issued for coal, if the permittee shows to the Secretary that he discovered commercial quantities of coal. (2) If the permit is for sodium, sulphur, or potassium, the authorized officer may not issue a lease unless the permittee also shows that the land is chiefly valuable for the development of the mineral deposit discovered.

(b) *Lease area.* The lease shall be for all or part of the lands in a reasonably compact form.

(c) *Standards to determine "valuable deposit" and "commercial quantities."* A permittee has discovered commercial quantities of coal or a valuable deposit of one of the other permit minerals if the mineral deposit discovered under the permit is of such a character and quantity that a prudent person would be justified in the further expenditure of his labor and means with a reasonable prospect of success in developing a valuable mine. The permittee must present sufficient evidence to show that there is a reasonable expectation that his revenues from the sale of the mineral will exceed his costs of developing the mine, and extracting, removing, and marketing the mineral.

(d) *Applicability.* The standard in paragraph (c) of this section shall apply to all future applications for leases by prospecting permittees, and to applications pending on the effective date of this regulation. Leases which have been issued prior to that date may not be reexamined to determine whether they meet the standards in paragraph (c) of this section.

2. 43 CFR Subpart 3521 is amended by revising § 3521.1-1 and adding §§ 3521.1-4, and 3521.1-5 to read as follows:

§ 3521.1-1 Forms.

(a) (1) An application for a lease by a prospecting permittee shall be filed within 30 days after the permit expires.

(2) If a permittee needs additional time to submit the information required by section 3521.1-1(b) of this part and files, within 30 days after the permit expires or within 60 days from the effective date of these regulations, whichever is later, a notice of application and [illegible] authorized officer shall extend the time for submitting the required information for the period requested, but for not more than one year.

(b) *Initial showing.* The initial application for a lease shall contain the following [illegible]

(1) The quantity and quality of the minerals discovered within the area included within the permit. The term "quantity of minerals" means only measured and indicated reserves. Structural maps of the tops of all beds to be mined; isopachous maps of beds to be mined and interburden; and isopachous maps of overburden (for beds to be mined by surface methods). These maps shall show the location of test holes and outcrops. Estimates of measured and indicated reserves for each bed to be mined must also be submitted. Coal quality data submittals shall include, as a minimum, an average proximate analysis and BTU content for coal beds, or average grade of the ore for other minerals. In addition, all supporting geological and geophysical data used in development of the above required information shall be submitted.

(2) A map, or maps, as may be available from State or Federal sources, which shows the topography of the land applied for, on which the applicant shall show physical features and natural drainage patterns and existing roads, vehicular trails, and utility systems; the location of any proposed development or mining operations and facilities incidental thereto, including the appropriate locations and areal extent of the areas to be used for pits, overburden, and tailings; and the location of water sources or other resources which may be used in the proposed operations or facilities incidental thereto.

(3) A narrative statement, including:

(i) The anticipated scope, method, and schedule of development operations, including the types of equipment to be used;

(ii) The method of mining anticipated, including the best available estimate of the mining sequence and production rate to be followed;

(iii) The relationship, if any, between the mining operations anticipated on the lands applied for and existing or planned mining operations, or facilities incidental thereto, on adjacent Federal or non-Federal lands;

(iv) A brief description, including suitable maps or aerial photographs as appropriate, of the existing land use within and adjacent to the lands applied for, and of known geologic, visual, cultural, or archaeological features, and the known habitat of fish and wildlife, particularly threatened and endangered species, that may be affected by the proposed or reasonably anticipated exploration or mining operations; and

(v) A brief description of the proposed measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, damage to fish and wildlife or other natural resources, air and noise pollution, and hazards to public health and safety; to reclaim [illegible] face; and to otherwise meet applicable laws and regulations which the applicant

w/shes to have considered by the authorized officer.

(c) *Final Showing.* After the permittee receives the technical environmental analysis report and proposed lease form prepared in accordance with § 3521.1-5 this subpart, he shall submit the following information:

(1) Estimated revenues;

(2) All the estimated costs that a prudent person would consider before deciding to operate a mine, including the cost of:

(i) Developing the mine;

(ii) Removing the mineral;

(iii) Processing necessary to place the mineral in a saleable condition;

(iv) Transporting the mineral product to the point of sale (f.o.b.);

(v) Applicable royalties and taxes; and

(vi) Complying with existing governmental regulations, reclamation and environmental standards, and proposed lease terms;

(3) A comparison of estimated costs and estimated revenues; and

(4) If the permittee intends to mine the deposit in the land covered by the permit as part of a logical mining unit in conjunction with related deposits, the permittee's showing may include the estimated costs and revenues of the combined mining venture.

(d) *Additional showing for permits issued for potassium, sodium, and sulphur.* In addition, if the prospecting permit was granted for sodium, sulphur, or potassium, the lease application shall also contain sufficient information to show that the land is chiefly valuable for the development of the mineral deposit discovered.

(e) *Amount of detail required.* The information submitted by the permittee shall be sufficient to enable the authorized officer to ascertain whether the permittee's showing has a reasonable factual basis and supports his assertion that:

(1) He has found commercial quantities of coal if the permit was issued for coal; or

(2) He has found a valuable deposit of the minerals covered by the permit if the permit was issued for a mineral other than coal; and

(3) The land is chiefly valuable for the mineral deposit if the permit was issued for sodium, sulphur, or potassium.

(f) *Rental to be submitted.* The initial application must be accompanied by the first year's rental at the rate of 25 cents per acre or fraction thereof except that:

(1) Sulphur. The application shall be accompanied by the first year's rental at the rate of 50 cents per acre or fraction thereof.

(2) Solid (hardrock) minerals. The application shall be accompanied by a payment of $1 for each acre or fraction thereof included in the application, but not less than $20.

(g) *Action if additional information is needed.* (1) If the permittee has not submitted the information this section requires, the authorized officer shall inform the permittee of the omissions and shall give the permittee an opportunity to submit the necessary information. The request for additional information shall specify:

(i) The information the permittee has failed to provide; and

(ii) The date by which the permittee must submit the omitted information, but the authorized officer shall allow no less than 60 days for a response.

(2) The authorized officer may grant the permittee an extension of time to respond to a request for additional information if the permittee requests an extension before the expiration of the period originally stated.

(3) The authorized officer shall reject the lease application if the permittee does not respond to a request for information on time.

(h) *Action if showing is satisfactory.* The authorized officer shall issue a lease to the permittee, if, after reviewing the lease application, he determines:

(1) That the permittee has presented information that has a reasonable factual basis, and the information supports the permittee's assertion that:

(i) He has found coal in commercial quantities if the permit was issued for coal; or

(ii) He has found a valuable deposit of the mineral covered by the permit if the permit was issued for a mineral other than coal; and

(iii) If the permit was issued for sodium, sulfur, or potassium, that the land is chiefly valuable for the mineral deposit; and

(2) That the permittee has taken into account all the factors required by this section.

(i) *Basis for denial of lease application.* The authorized officer may reject the application and inform the permittee of the grounds for the rejection, or request additional information under the procedures in paragraph (g) of this section if he determines that the evidence submitted by the permittee does not support his assertion that:

(1) He has found commercial quantities of coal if the permit was issued for coal; or

(2) A valuable deposit of the mineral covered by his permit if the permit was issued for mineral other than coal; or

(3) If the permit was issued for sodium, sulphur, or potassium, that the land is chiefly valuable for the mineral deposit.

(j) *Hearing and appeal procedures.* (1) If the permittee's application is rejected, he may file a notice of appeal and statement of reasons for appeal in accordance with the procedures of 43 CFR Part 4.

(2) The permittee shall have a right to a hearing before an Administrative Law Judge in the Office of Hearings and Appeals if he has alleged, in his application, facts sufficient to show that he is entitled to a lease.

(3) At the hearing the permittee shall have both the burden of going forward and the burden of proof and must show by a preponderance of the evidence that he has discovered coal in commercial quantities, or a valuable deposit of one of the other minerals, and if his application is for a sodium, sulphur or potassium lease, that the land is chiefly valuable for the mineral deposit discovered.

§ 3521.1-4 Technical examination/environmental analysis.

In connection with an application for a lease, the authorized officer, with the assistance of the Mining Supervisor, shall make a technical examination and environmental analysis.

(a) The technical examination shall include: (1) an examination of the technical aspects of the proposed operations set forth in the lease application; and

(2) an evaluation of the impacts of such operations on other land uses, resources, or land management programs on or adjacent to the area.

(b) The environmental analysis shall include an analysis of the impact of the proposed operations set forth in lease application.

§ 3521.1-5 Technical examination/environmental analysis report.

(a) Following completion of the technical examination and environmental analysis described in the preceding section, the authorized officer shall prepare a report which sets forth recommendations as to (1) land where reclamation is not attainable or assured; (2) measures required to comply with the reclamation and performance standards set forth in Subpart 3041 of this Chapter; (3) necessary conditions and amounts of bonds to cover estimated reclamation costs for areas that will be disturbed during the initial 5-year period of the lease, permit, or license; (4) any additional, more stringent requirements needed in the lease pursuant to § 3041.2-2(a) of this Subpart; and (5) proposed lease terms and stipulations.

(b) The authorized officer shall send a copy of this report to the lease applicant.

Effective date. May 7, 1976.

THOMAS S. KLEPPE,
Secretary of the Interior.

[FR Doc.76-13284 Filed 5-6-76;8:45 am]

Title 45—Public Welfare

CHAPTER XII—ACTION

PART 1221—RETIRED SENIOR VOLUNTEER PROGRAM COST SHARING

Adoption of Interim Regulations

On March 10, 1976, there was published in the FEDERAL REGISTER (41 FR 10228), a notice of an interim amendment to Chapter XII, Part 1221. The interim amendment prescribed the maximum local share contribution required for grants under the Retired Senior Volunteer Program (RSVP). ACTION may not require the local cost share contribution to exceed annual percentages of approved budgets: 10 percent in the first year; 20 percent in the second year; and 50 percent in any subsequent year.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

February 18, 1976

Memorandum

To: District Mining Supervisor, Pocatello, Idaho
Through: Area Geologist, Pacific Area TKL 2/23/76
Area Mining Supervisor, Alaska-Pacific Area

From: Geologist, Menlo Park

Subject: Geologic Report on Competitive Phosphate Lease Application I-9920, IMC Corporation

Include Sentence: The following geologic report is submitted in response to your request dated ____, and received by this office ____.

The subject application involves the following lands in Caribou County, Idaho, containing 1,560 acres (631.3 hectares):

T. 8 S., R. 45 E., Boise Meridian

Sec. 27: SW¼NW¼, SW¼
Sec. 34: NW¼, N½SW¼, W½SE¼, SE¼SW¼

T. 9 S., R. 45 E., Boise Meridian

Sec. 3: E½W½, W½E½
Sec. 10: NE¼NW¼, W½E½
Sec. 15: W½E½
Sec. 22: E½W½, W½NE¼, NW¼SE¼
Sec. 27: NE¼NW¼

The existence of a known phosphate resource is known in the applied for lands. The subject lands are valuable prospectively for oil and gas but are not considered valuable prospectively for geothermal steam and associated geothermal resources.

The subject lands are located in a remote and rugged part of the Caribou National Forest; along the east slope of Freeman Ridge, in the southern portion of the Webster Range (see Figure 1). Freeman Ridge trends north and is bounded by Diamond Creek on the west and a portion of the South Fork of Timber Creek on the east. Elevations range from

6,940 feet (2,117 metres) near Smith Sawmill to approximately 8,600 feet (2,623 metres) atop Freeman Ridge. The area is accessible by light duty roads and unimproved dirt roads from Georgetown, Idaho, which is located 16 air miles (26 km) to the southwest.

The geology of the subject lands (located within the Stewart Flat and Snowdrift Mountain 7½ minute quadrangles (U.S.G.S. 1949), has been described by Mansfield (1927), Cressman (1964), and by Montgomery and Cheney (1967). Additional stratigraphic and analytical data was derived from McKelvey et al and Sheldon et al (1953). The rocks exposed in the area are all sedimentary and range from Pennsylvanian to Triassic in age. The rocks consist of: limestone, sandstone and chert of the Wells Formation; dolomite and limestone of the Grandeur Tongue of the Park City Formation; phosphate rock, phosphatic mudstone, mudstone and chert of the Phosphoria Formation; and shale, siltstone and limestone of the Dinwoody Formation. Quaternary age alluvial deposits overlie the older sedimentary rocks in the lowlands; to the east of Freeman Pass, near the South Fork of Sage Creek, and along the South Fork of Timber Creek, (see geologic map, Figure 1).

The rocks of economic interest are in the Phosphoria Formation of Permian age. The formation is about 450 feet (138 metres) thick and is divided into three members. In ascending age they are; Meade Peak Phosphatic Shale Member, the Rex Chert Member, and the cherty shale member. The Meade Peak Phosphatic Shale Member contains all the economically important phosphate in southeastern Idaho. It consists of phosphate rock, phosphatic mudstone, mudstone with minor limestone interbeds and ranges from 146 feet (45 metres) to 200 feet (61 metres) in thickness. The Rex Chert Member consists of chert with lenses of limestone, and ranges from 135 feet (41 metres) to 150 feet (45 metres) in thickness. The cherty shale member consists of mudstone and cherty mudstone and is about 100 feet (31 metres) thick.

The regional structure is dominated by north trending folds that are located in the upper plate of the Meade overthrust fault. Most of the folding in the upper plate of the Meade overthrust occurred during the period of thrusting initiated in Early Cretaceous time (Cressman, 1964).

Rocks in the applied for lands crop out along the steeply dipping east limb of the Snowdrift anticline. The Meade Peak Phosphatic Shale Member strikes north and dips from 50 degrees to 85 degrees to the east, with vertical dips at the extreme northern portion of the applied for lands (see geologic map, Figure 1). The northern portion of the Deer Creek Fault, a transverse fault with reverse movement, offsets the Meade Peak in the extreme southern portion of the subject area at an approximate depth of 200 feet (61 metres) below the ground surface, (see cross section A-A', Figure 2a). The Meade Peak is commonly offset by transverse faults most of which are of too small displacement to be shown on the 1:24,000 scale geologic maps (Cressman, 1964).

Four complete sections of the Meade Peak Phosphatic Shale Member have been measured by the U. S. Geological Survey in trenches located adjacent to the applied for lands. The average grade and thickness of the phosphate rock within the subject phosphate lease application were extrapolated from these nearby selected trenches. The lower phosphate zone of the Meade Peak has an average thickness of 29.0 feet (8.8 metres) with a weighted average of 25.3% P_2O_5. The upper phosphate zone has an average thickness of 26.6 feet (8.1 metres) with a weighted average of 25.6% P_2O_5, (see Table 1 for trench data summary). Although the phosphate zones in southeast Idaho are remarkably continuous laterally, small local variations in thickness and grade are possible.

The outcrops of phosphate rock within the applied for lands were divided into five sub-areas (A to E) that were constructed to isolate areas of similar structure (see Figure 3). The reserves of phosphate rock were calculated for each sub-area, assuming a maximum mining depth of 600 feet (183 metres). In each sub-area a typical cross-sectional area of phosphate rock, from the lower and upper phosphate zone was multiplied by the strike length of the outcrop to determine the volume of phosphate rock in cubic feet. The volume was converted to short tons by the factor of 12 cubic feet of phosphate rock per ton. The calculated in-place reserves of phosphate rock in the applied-for lands are 80,021,958 short tons (72,594,320 metric tons). Due to the lack of trench data within the applied for lands and the potential of local variations in thickness and grade of the phosphate rock, only 75% of the original calculated in-place reserves or 60,016,468 short tons (54,445,739 metric tons) of phosphate rock are considered recoverable by conventional strip mining methods, (see Table 2).

Problems Associated With Mining

1) Poor access to portions of the subject phosphate lease application.

2) Remoteness of the subject phosphate lease application to an existing processing plant.

3) Environmental restraints within a National Forest.

4) Potential slope instabilities -

The steeply dipping footwall (Wells Formation) may have to be terraced to slopes that are lower than the existing structural dips in order to prevent slope failures when mining. Slope failures in the Wells Formation have been observed in strip mines with dipslopes less than 60°.

The Meade Peak Phosphatic Shale Member dips vertically in the northern portion of the subject phosphate lease application.

5) Erosion and siltation -

In sub-areas B, D, and E, a 600 foot (183 metre) mining depth would necessitate undercutting the stream channels of the South Fork of Timber Creek (an intermittent stream) and the upper portions of Sage Creek up to Hill Spring in sec. 15.

6) In sub-area A, the Meade Peak is offset by the northern portion of the Deer Creek Fault, at an approximate depth of 200 feet (61 metres) below the ground surface. The amount of displacement is not known, (see cross-section A-A', Figure 2a).

7) Potential faults, too small to map at a 1:24,000 scale (Cressman 1964), may be encountered during mining.

The area applied for in the lease application is underlain by valuable phosphate deposits.

References:

Cressman, E. R., 1964, Geology of the Georgetown Canyon - Snowdrift Mountain area, southeastern Idaho: U. S. Geological Survey Bulletin 1153.

Mansfield, G. R., 1927, Geography, geology, and mineral resources of part of southeastern Idaho: U. S. Geological Survey Professional Paper 152.

McKelvey, V. E., and others, 1953, Stratigraphic sections of the Phosphoria Formation in Idaho, 1947-48, Part I: U. S. Geological Survey Circular 208.

Montgomery, K. M., and Cheney, T. M., 1967, Geology of the Stewart Flat quadrangle Caribou County, Idaho: U. S. Geological Survey Bulletin 1217.

Sheldon, R. P., and others, 1953, Stratigraphic sections of the Phosphoria Formation in Idaho, 1949, Part I: U. S. Geological Survey Circular 304.

Peter Oberlindacher

Table 1

U. S. Geological Survey Trench Data Summary

USGS Lot No. and Location	Upper Phosphate Zone Thickness ft.	(metres)	Percent P_2O_5	Lower Phosphate Zone Thickness ft.	(metres)	Percent P_2O_5
Lot 1268 Sec. 34, T. 9 S., R. 45 E.	36.6	(11.2)	20.2	20.8	(6.3)	23.4
Lot 1298 Sec. 4, T. 8 S., R. 45 E.	22.8	(7.0)	29.0	40.8	(12.4)	25.9
Lot 1303 Sec. 31, T. 8 S., R. 46 E.	23.4	(7.1)	27.8	19.8	(6.0)	26.1
Lot 1310 Sec. 21, T. 8 S., R. 45 E.	26.7	(8.1)	27.4	34.5	(10.5)	25.2
Avg. used for Lease Application I-9920	26.6	(8.1)	25.6 wt. average	29.0	(8.8)	25.3 wt. average

USGS Conservation Division
Western Region
Office of the Area Geologist
Compiled by R. D. Hovland
2/18/76

Table 2

Reserve Calculations*

Sub-area	in-place tons (short)	in-place tons (metric)	in-place tons (short) x .75 = recoverable reserves	tons (metric)
A	3,410,708	3,094,126	2,558,031	2,320,595
B	33,318,000	30,225,423	24,988,500	22,669,067
C	22,597,708	20,500,188	16,948,281	15,375,142
D	13,170,667	11,948,165	9,878,000	8,961,124
E	7,524,875	6,826,416	5,643,656	5,119,812
Totals	80,021,958	72,594,320	60,016,468	54,445,739

*using 600 foot mining depth

USGS Conservation Division
Western Region
Office of the Area Geologist
Compiled by R. D. Hovland
2/18/76

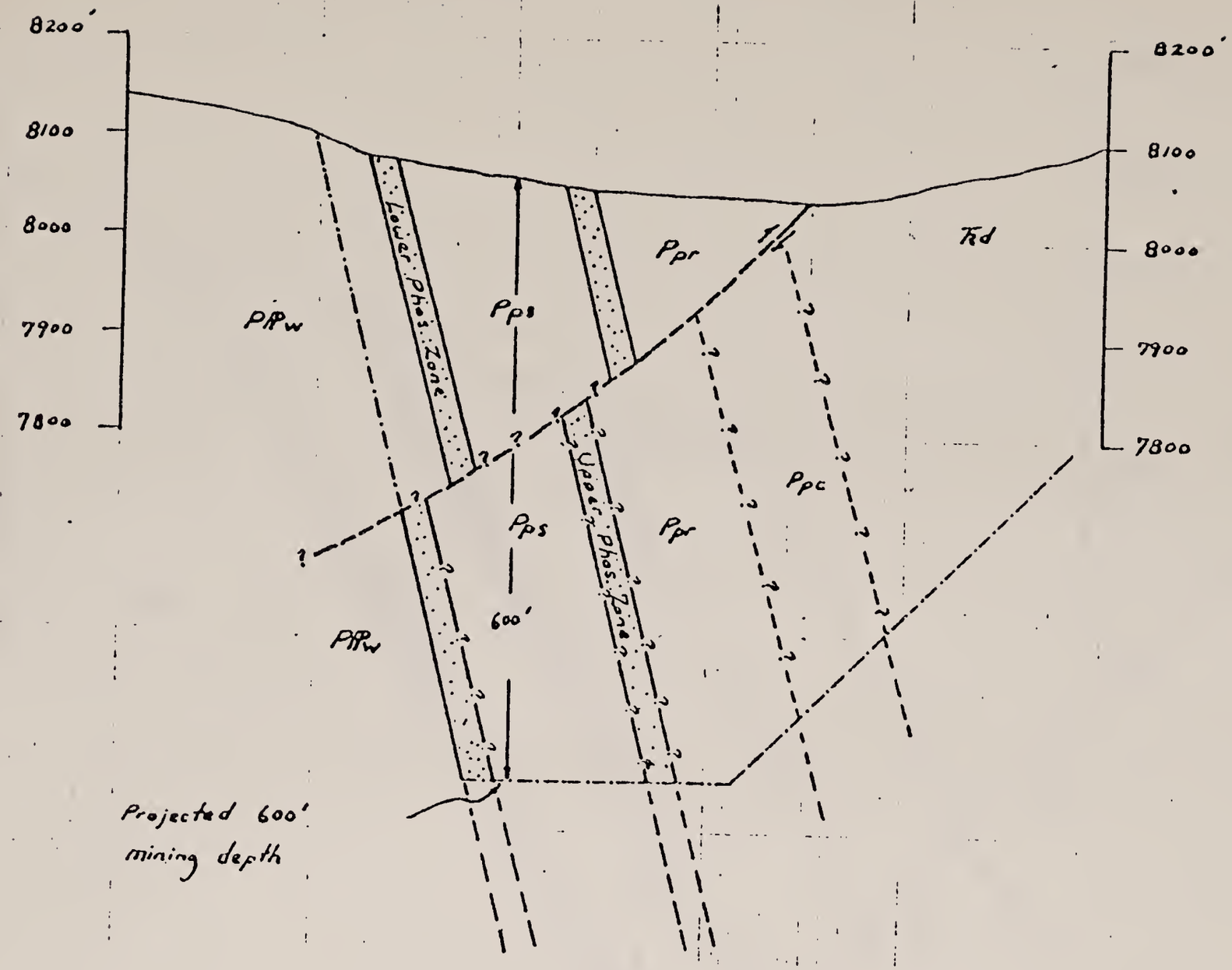

8200'
8100
8000
7900
7800
8200'
8100
8000
7900
7800
Lower Phos. Zone
Upper Phos. Zone
Ppr
Kd
Pps
Ppc
Pp
600'
Projected 600' mining depth

FIGURE 2b

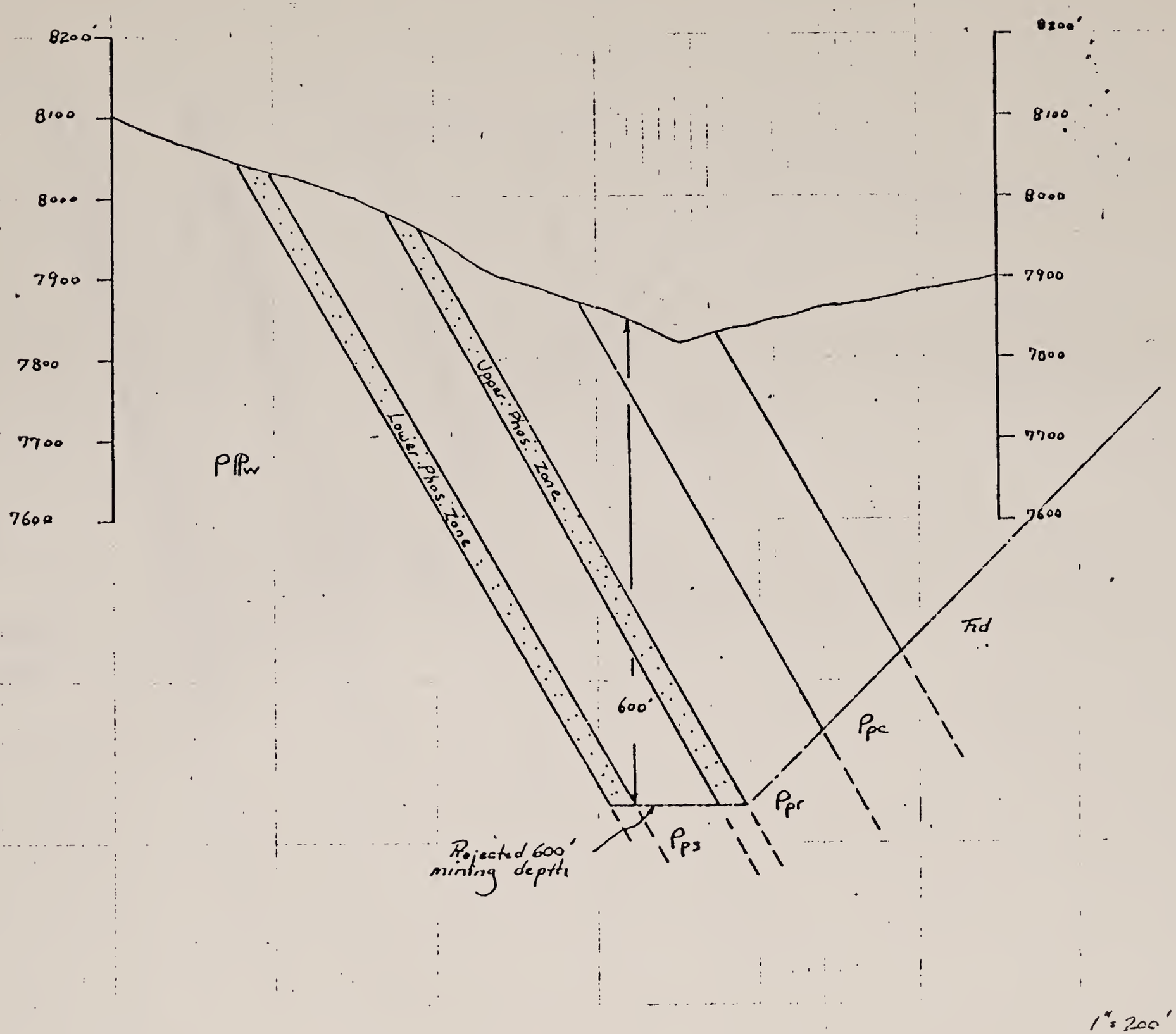

B
B
8200'
8100
8000
7900
7800
7700
7600
8200'
8100
8000
7900
7800
7700
7600
PPw
Lower Phos. Zone
Upper Phos. Zone
600'
Projected 600' mining depth
Ppc
Ppr
Pps
Trd
1" = 200'

FIGURE 2c

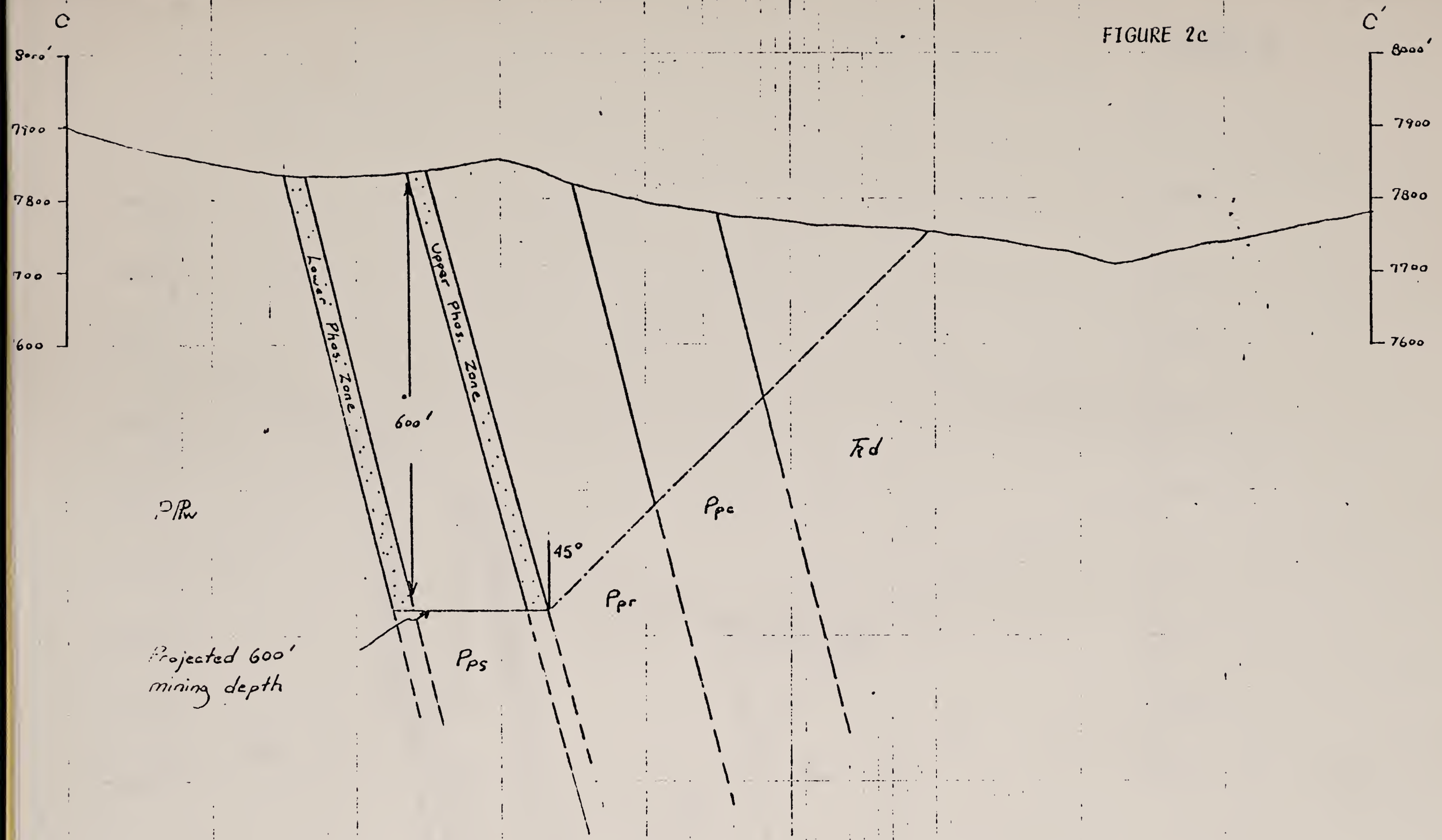
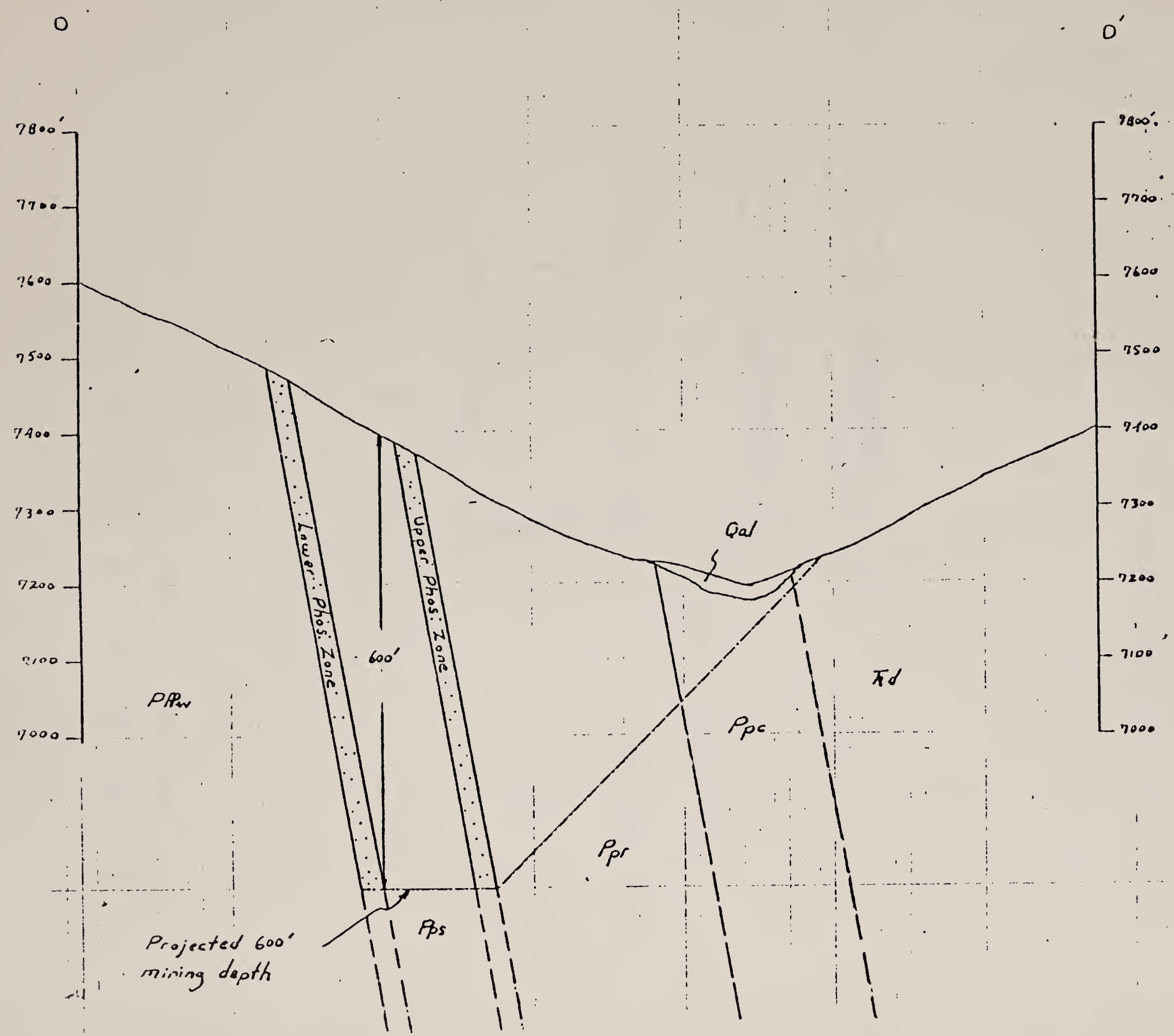
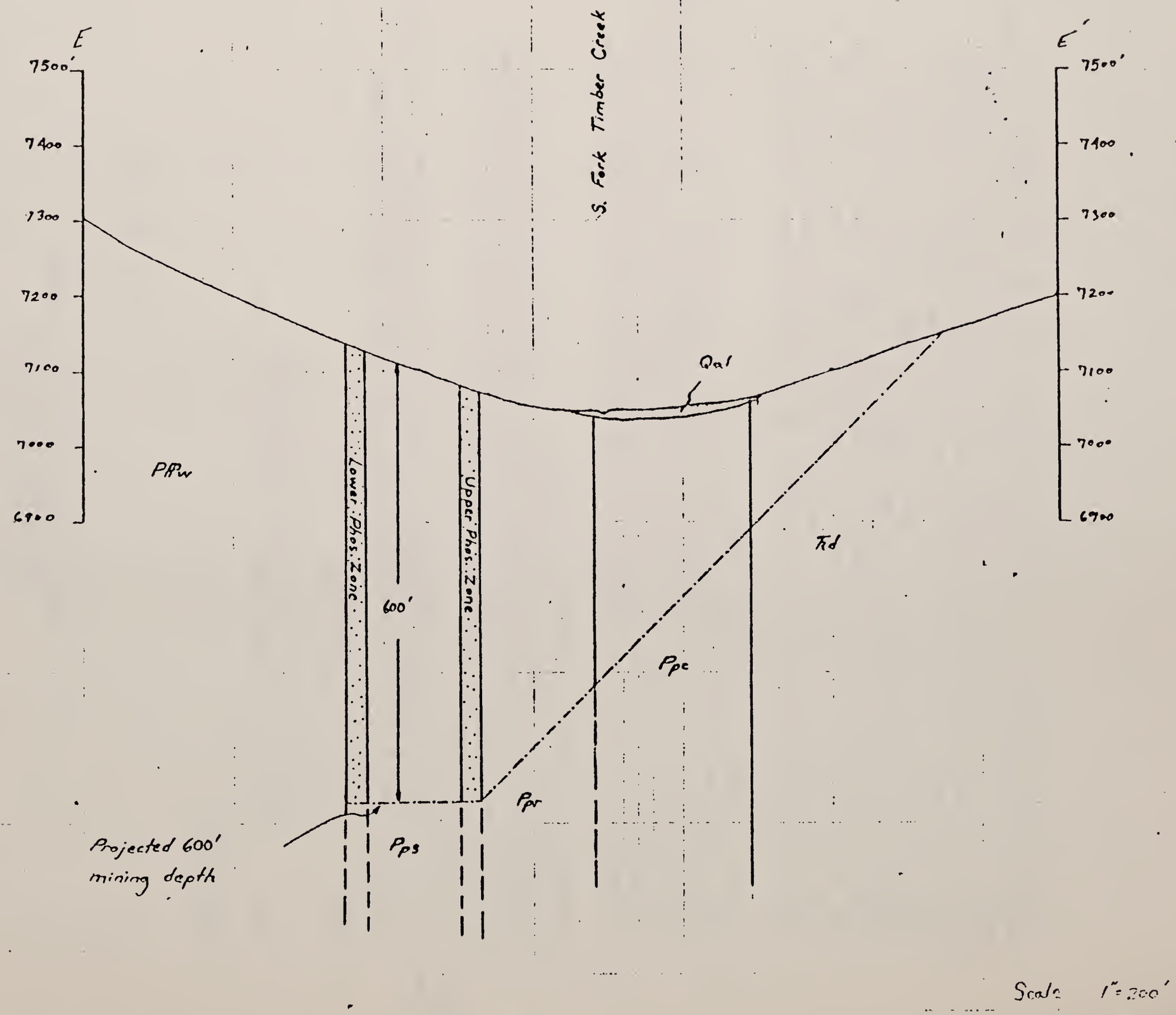

C
C'
8000'
7900
7800
7700
7600
Lower Phos. Zone
Upper Phos. Zone
600'
45°
Ppw
Ppc
Ppr
Pps
Fd
Projected 600' mining depth

FIGURE 2d


O
O′
7800′
7700
7600
7500
7400
7300
7200
7100
7000
7800′
7700
7600
7500
7400
7300
7200
7100
7000
Lower Phos. Zone
Upper Phos. Zone
600′
PPw
Qal
T̄Rd
Ppc
Ppr
Pps
Projected 600′ mining depth


E
E'
7500'
7400
7300
7200
7100
7000
6900
S. Fork Timber Creek
Qal
PPw
Lower Phos. Zone
Upper Phos. Zone
600'
Td
Ppc
Ppr
Pps
Projected 600' mining depth
Scale 1" = 200'

EXAMPLE

Conservation Division
345 Middlefield Road
Menlo Park, California 94025

July 30, 1973

Memorandum

To: Area Mining Supervisor, Alaska-Pacific Area
Through: Area Geologist, Pacific Area

From: Geologist, Menlo Park

Subject: Geologic report on preference right lease application S-1220, Trinity County, California

Include sentence { The following geologic report is submitted in response to your request dated ____, and received by this office ____.

The information submitted by the lease applicant together with the information contained in published reports and first-hand field investigations is sufficient to demonstrate the discovery of a valuable sodium deposit (magadiite - hydrated sodium silicate).

The magadiite deposit is located in a possible fault zone contact between a metadacite and a serpentine and a talc-tremolite schist. According to Gude and Sheppard (1969), the magadiite was probably deposited from alkaline, saline springs near the present surface in the recent past. The springs that issue from the magadiite deposit itself (fig. 1) and nearby have a pH of 10.3-10.9 (Gude and Sheppard, 1969).

The extent of the deposit is not obvious on the surface due to extensive slope wash and human activity. However, due to the extreme alkalinity of the deposit, a rough gauge of the lateral extent can be gotten from the type of vegetation over the deposit. Coniferous trees seem to have a low tolerance for alkaline conditions and there are no pine trees growing in the slope wash over the deposit. In their place, scrub oak and poison oak abound (figures 1 and 2). Utilizing the assumption that the presence of scrub oak roughly defines the lateral extent of the deposit, an area 30 yards wide and no more than 100 yards long would be the minimum lateral extent of the deposit. The overburden (slope wash) ranges from 3 feet thick at the bulldozer cut to in excess of 30 feet back from the outcrop.

Figure 1. View of magadiite deposit showing old bulldozer cut and highly alkaline springs.

Figure 2. View of magadiite deposit showing different vegetation growths.

Figure 3. Trench exposing a minimum of 16 feet of magadiite at the old bulldozer cut.

The applicant has blocked out about 2600 cubic yards of magadiite by drilling hand-auger holes horizontally or at shallow angles into the deposit from the face exposed in the bulldozer cut. This is a realistic minimum conservative figure as none of the auger holes completely penetrated the deposit. Figure 3 is a photo showing a trench exposing a minimum thickness of 16 feet of magadiite at the face of the old bulldozer cut.

Also found in this deposit are several rare minerals previously unreported outside of Africa - kenyaite, mountainite, and rhodesite. Two new minerals have been or are being described--silhydrite (Gude and Sheppard, 1972) and trinityite (now being described by R.A. Sheppard, USGS). These minerals have some collectors' value due to their rarity and locality, and when separated from the prime mineral of the deposit, magadiite, would add to the economics of the entire deposit.

References:

Gude, A.J., III, and Sheppard, R.A., 1969, Hydrous sodium silicate minerals, Trinity County, California: in Geol. Soc. America, 1969, pt. 7, p. 86.

Gude, A.J., III, and Sheppard, R.A., 1972, Silhydrite, $3SiO_2 \cdot H_2O$, a new mineral from Trinity County, California: Amer. Mineralogist, vol. 57, p. 1053-1065.

Selected Bibliography:

Barnes, Ivan, Rapp, J.B., O'Neil, J.R., Sheppard, R.A. and Gude, A.J., III, 1972, Metamorphic assemblages and the direction of flow of metamorphic fluids in four instances of serpentinization: Contr. Mineral and Petrol., vol. 35, p. 263-276.

Eugster, H.P., Jones, B.F., and Sheppard, R.A., 1968, New hydrous sodium silicates from Kenya, Oregon, and California: possible precursors of chert (abstr.): Geol. Soc. America, Spec. Paper 115, p. 60-61.

McAtee, J.L., Jr., House, R., and Eugster, H.P., 1968, Magadiite from Trinity County, California: Amer. Mineralogist, vol. 53, p. 2061-2069.

Sheppard, R.A., and Gude, A.J., III, 1969, Rhodesite from Trinity County, California: Amer. Mineralogist, vol. 54, p. 251-255.

William L. Lee

db

Date 6/25/76

.....a.m.....p.m

OFFICE OF THE ASSISTANT DIVISION CHIEF,
RESOURCE EVALUATION
CONSERVATION DIVISION
U. S. GEOLOGICAL SURVEY

To: ~~Henry Cullins~~ Verne Stephens
Menlo Park

Please send me a mineral report for the lands described in attached Congressional Bill S. 3537.

My due date is 7/7/76.

Robert Schrott

RECEIVED
U.S. Geological Survey

JUL 2 1976

Conservation Division
Western Region
Menlo Park, Calif.

To Chief Fun Mgr
Atte. Bob Schrott
From PAG

INT: 3340-75

94TH CONGRESS
2D SESSION

S. 3537

IN THE SENATE OF THE UNITED STATES

JUNE 8 (legislative day, JUNE 3), 1976

Mr. JACKSON introduced the following bill; which was read twice and referred to the Committee on Interior and Insular Affairs

A BILL

For the relief of Marian Law Shale Holloway, Adeline Mary Gill Charles, and Eliza Shale Carstens.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That (a) notwithstanding any other provision of law, the
4 Secretary of the Interior is authorized and directed to pay,
5 out of any money appropriated to the Department of the
6 Interior, to Marian Law Shale Holloway, Adeline Mary Gill
7 Charles, and Eliza Shale Carstens (or to their estates) such
8 sums as he determines each is legally and equitably entitled
9 to as compensation for losses (including reasonable attorney
10 fees) resulting from his erroneous approval of purported
11 conveyances of parts or all of lot 6, section 35, township 24

1 north, range 13 west Williamette meridian, containing
2 eighteen and seventy-five hundredths acres, more or less,
3 according to the Government survey thereof, such prop-
4 erty being a portion of the allotment of Hattie Smith, de-
5 ceased, Quinault allottee numbered 420, and which is not
6 subject to homestead entry. Such property is situated in
7 Jefferson County, State of Washington on the Quinault
8 Indian Reservation.

9 (b) The payment and acceptance of such compensation
10 pursuant to this Act shall be in full satisfaction of all claims
11 (1) of the said Marian Law Shale Holloway, Adeline Mary
12 Gill Charles, and Eliza Shale Carstens, against the United
13 States or any officer or employee thereof arising out of or in
14 connection with the purported conveyances of such property
15 or portions thereof approved by or on behalf of the Secretary
16 of the Interior on February 19, 1951, September 3, 1953,
17 and April 19, 1955, and (2) by Adeline Mary Gill Charles
18 and Eliza Shale Carstens against Marian Law Shale Hollo-
19 way arising out of or in connection with the purported con-
20 veyances of portions of such property approved by or on
21 behalf of the Secretary of the Interior on September 3, 1953,
22 and April 19, 1955.

23 (c) As a condition precedent to receiving payment of
24 such compensation pursuant to this Act, the said Marian
25 Law Shale Holloway, Adeline Mary Gill Charles and Eliza

1 Shale Carstens (or the executors of their estates) shall exe-
2 cute such releases and other documents as the Secretary of
3 the Interior determines are necessary to fulfill the purposes
4 of this Act and remove any cloud on the title to such
5 property.

6 SEC. 2. No part of the amount appropriated by this Act
7 in excess of 10 per centum thereof shall be paid or delivered
8 to or received by any agent or attorney on account of services
9 rendered in connection with this claim, and the same shall be
10 unlawful, any contract to the contrary notwithstanding. Vio-
11 lation of the provisions of this section is a misdemeanor pun-
12 ishable by a fine not to exceed $1,000.

Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

July 7, 1976

Memorandum

To: Acting Chief, Conservation Division
Attn: Robert Schrott

Through: Acting Conservation Manager, Western Region

From: Area Geologist, Pacific Area

Subject: Mineral report for Senate Bill S. 3537; lot 6, section 35, Township 24 north, range 13 west, Willamette Meridian.

The subject lands are located approximately two miles from the Pacific Ocean on the coastal plain of the Olympic peninsula in Washington. The parcel is just east of the town of Queets on the Queets River.

Mesozoic-Tertiary marine rocks underlie the interior Olympic Peninsula and are believed to underlie the subject lands.

The rocks along the west coast of the peninsula, including the coastal plain, are covered by Pliocene-Pleistocene marine terrace deposits that consist of unconsolidated sand and gravel with minor amounts of silt and clay.

The subject lands are located within an area that has been classified valuable prospectively for oil and gas. Local exploratory drilling has resulted in shows of oil and gas but no producible quantities to date.

No other leasable or locatable minerals are known to exist in the subject locality.

Henry L. Cullins

FS:sj
File:

University of Idaho
Center for Business Development
and Research
Moscow, Idaho/83843
Phone (208) 885-6611, 6612

June 9, 1975

Mr. Peter Oberlindacher
345 Middlefield Road
Menlo Park, California 94025

Dear Mr. Oberlindacher:

I am currently working on a project at the University of Idaho that is concerned with the leasing of geothermal resource lands in the state of Idaho. The project is funded through the Idaho Research Foundation under a Short Term Applied Research grant.

I have questions concerning the social impact geothermal production will have on an area. If it is possible, I would appreciate it if you could answer the following questions:

1. What is the potential of geothermal energy production in Idaho?

2. What affect will geothermal production have on land use in a local area?

3. What existing and potential land uses are compatible with geothermal development?

I appreciate your time and effort, and I am looking forward to hearing from you.

Sincerely,
FOR THE TEAM

John P. McLaughlin

JPM:kc

Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

June 12, 1975

Mr. John P. McLaughlin
University of Idaho
College of Business and Economics
Moscow, Idaho 83843

Dear Mr. McLaughlin:

I have received your request for geothermal resource data in Idaho. As a geologist, my main concern and expertise lies in locating and evaluating geothermal and other leasable mineral resources. I will, therefore, not attempt to answer your second and third questions dealing with impact on land use and land use compatibility. I am referring these last two questions to the Geothermal Supervisor's office which is better equipped to field your questions.

Another source of information on your questions would be the BLM, Boise district in Boise, Idaho. Ask Miss Graetzer, the environmental specialist, for a copy of the Bruneau-Mountain Home environmental analysis record (EAR). The EAR deals extensively with geothermal production, impacts, land use and land use compatibility.

In regard to your question as to "What is the potential of geothermal energy production in Idaho?", we have identified extensive areas in Idaho that we consider valuable for exploration. In addition, we have at least seven known geothermal resources areas (KGRA's) in Idaho where we anticipate a potential discovery of geothermal resources for electric generation or other productive uses. In the Raft River KGRA, south of Malta, the government has drilled two successful geothermal wells and is now experimenting with low temperature utilization of the hot water for electric generation.

Exploration for geothermal resources in Idaho is in its beginning stages. We have insufficient drill data at this time to support much of the published geologic and geophysical data on the geothermal potential for Idaho. Economics, more than anything else, will probably dictate the future geothermal exploration activity in Idaho.

In summary, the future potential of geothermal energy production for electric power generation seems uncertain. On the other hand,

the potential for geothermal energy production for greenhouses, space heating and recreation in Idaho is here. The energy is being utilized and the demand will probably continue to increase as the price of other energy resources increase.

Sincerely,

Peter Oberlindacher

20

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
P. O. Box 1608
Pocatello, Idaho 83201

I-01381
I-01145

January 12, 1977

Memorandum

To: Area Geologist, Western Region, Menlo Park, CA

Through: Area Mining Supervisor, Alaska-Pacific Area, Menlo Park,

From: District Mining Supervisor, Pocatello, Idaho

Subject: Fringe Acreage Application to operating leases I-013814 and I-011451 (Henry Mine), Monsanto Co.

By memorandum dated January 7, 1977, the Boise State Office, BLM requested a report and recommendations from this office involving lands in SE¼NE¼ Sec. 31, T. 6 S., R. 43 E., B.M., Caribou County, Idaho.

The records of this office indicate the lands applied for have not previously been held under prospecting permit and/or lease.

The subject lands are bounded to the north and east by federal phos phate leases I-011451 and I-013184 respectively, both controlled by the applicant. All of the leased lands are part of the ongoing Hen Mine and are presently being stripped in preparation for 1977 production.

This office is not aware of competitive interest in the subject lan For more detailed information, refer to the attached application. copy of the application and accompanying maps are on file with the office of the Area Mining Supervisor.

May we have your geologic report at an early date, in that time is critical.

John T. Skinner

Attachments

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

January 24, 1977

Memorandum

To: District Mining Supervisor, Pocatello, Idaho

Through: Area Geologist, Pacific Area
Area Mining Supervisor, Alaska-Pacific Area

From: Geologist, Menlo Park

Subject: Geologic Report on Phosphate Fringe Acreage Application to operating leases I-013814 and I-011451 (Henry Mine, Monsanto Industrial Chemicals Co.)

The following geologic report is submitted in response to your request dated Jan. 12, 1977, and received by this office Jan. 18, 1977.

Prior to the evidence presented by the applicant, the existence of a known phosphate resource had not been established in the applied-for lands which include only the SE¼NE¼ of section 31, T. 6 S., R. 43 E., B.M., Idaho (see Figure 1).

The lands are considered valuable prospectively for phosphate was well as for oil and gas. The lands are not considered valuable prospectively for any other leasable minerals.

The subject lands are bounded to the north by lease I-011451 and to the east by I-013814, both controlled by the applicant.

The subject lands are located on the east side of Wooley Range at an elevation of about 6800 feet. The area is approximately 20 miles northeast of Soda Springs, Idaho. A partially paved road provides access to the area.

The only geologic map covering the area (Mansfield, 1927, pl. 4) published originally at a scale of 1:62,500 and partially reproduced on Figure 2 at a scale of 1:24,000 shows the 40 acre application area underlain by sandstone and limestone of the Pennsylvanian Wells Formation. The overlying Permian Phosphoria Formation, according to Mansfield lies to the northeast, and dips away from the applied-for land (see Figure 2).

The submitted company map (Figure 3) at a scale of 1 inch to 50 feet shows the Phosphoria Formation in the east half of the application area. According to the applicant, less than 100,000 tons of phosphate ore lie within the applied-for area, but the non-issuance of the 40 acres would prevent the company from recovering approximately 150,000 tons within their existing leases which border the area to the north and east.

Regional structure is dominated by prominent northwest-trending folds that are offset by west to northwesterly striking transverse faults. Another set of faults is generally oriented normal to the axes of the folds. In the cross sections faults are shown as vertical because in most cases the amount and direction of dip is probably uncertain.

An unnamed fault (plate 4, Prof. Paper 152) crosses section 30 and the NE¼ of section 31, T. 6 S., R. 43 E. from west to east. The fault truncates and offsets practically all of the northwest-trending structural features. The offset is greater than 4000 ft (1219 m). This major offset has undoubtedly greatly disturbed the structure of the phosphate both north and south of the fault. Based on the company submitted cross sections, asymmetrical folds which plunge southeasterly into the subject area are offset by numerous transverse and longitudinal faults. The phosphate rocks strike northwesterly with dips varying from 52 to 60 degrees to the northeast.

There are no other phosphate deposits in the immediate area of the applied-for fringe acreage lands. Except for the Phosphoria Formation along the eastern edge of the application lands as shown on Figure 3, the lands to the south and west of the area is underlain by the Wells Limestone. All of the phosphate to the north and east of the subject lands are leased by the present applicant.

From the evidence presented, the acreage underlain by the Phosphoria Formation in the SE¼NE¼ section 31, T. 6 S., R. 43 E., B.M., adjoining the applicant existing phosphate leases I-011451 and I-013814 is too small and isolated to be mined economically by anyone other than the applicant.

References Cited:

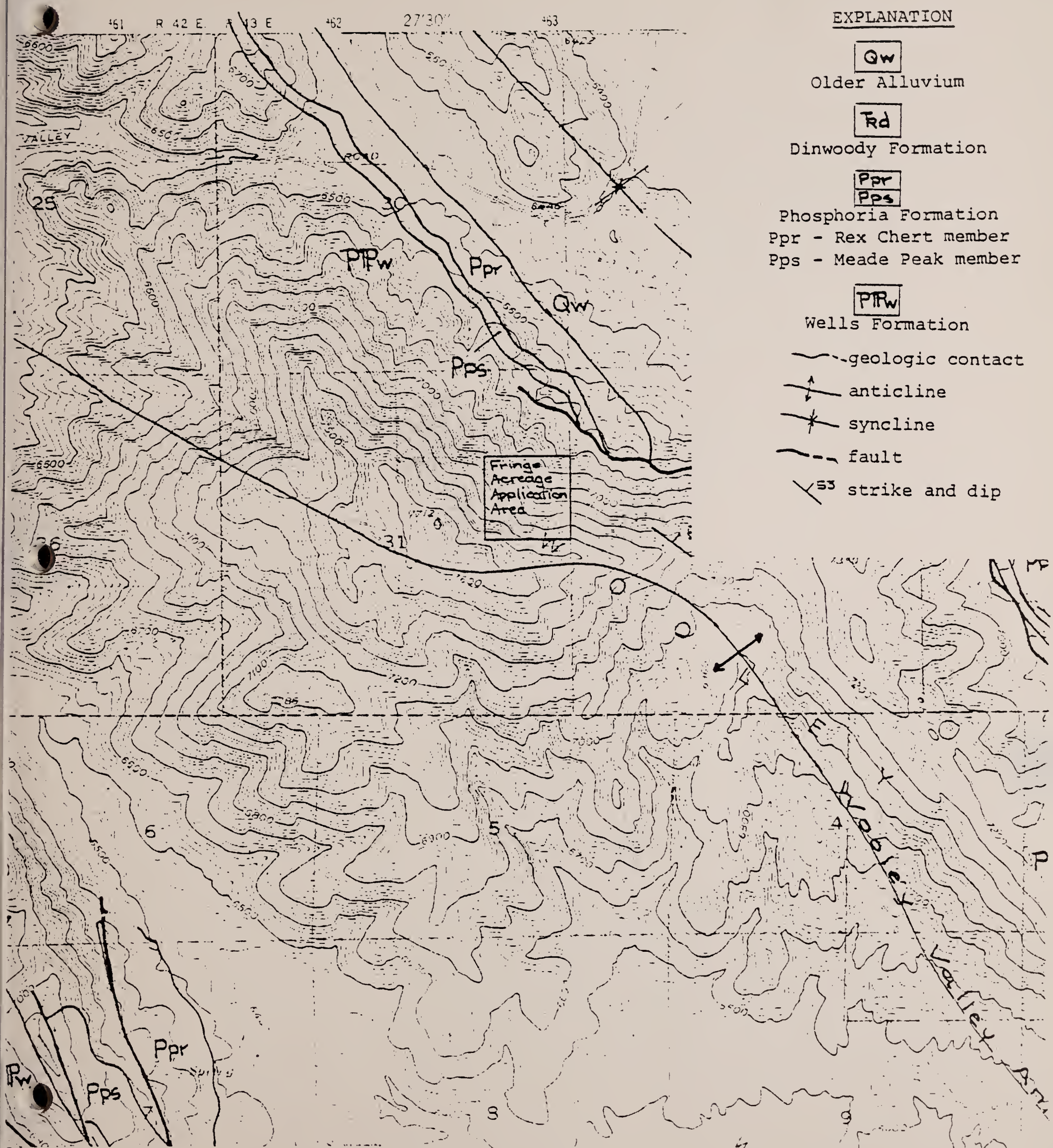
Mansfield, G. R., 1927, Geography, geology, and mineral resources of part of southeastern Idaho: U. S. Geol. Survey Prof. Paper 152, 453 p.

Williams, J. Steele, 1959, Fauna, age and correlation of rocks of Park City age, in McKelvey and others: U. S. Geol. Survey Prof. Paper 313-A, p. 1-47.

Peter Oberlindacher

U.S. Geological Survey
Conservation Division
Office of the Pacific
Area Geologist
Peter Oberlindacher
1-24-77

Figure 2. Geologic Map, Fring Acreage Application I-013813 and I-01145



Topography from Lower Valley 7½ minute Quad

Geology from Mansfield (1927, pl.4)

U.S. Geological Survey
Conservation Division
Office of the Pacific
Area Geologist
Peter Oberlindacher

or contract made until after consultation with the Federal Water Pollution Control Administration and a finding by the Administration that the proposed operation would not be in violation of the Federal Water Pollution Control Act, as amended (33 U.S.C. sec. 466 et seq.) or of Executive Order No. 11288 (31 F.R. 9261). Where a permit or lease is involved the district manager's determination shall be made in consultation with the mining supervisor.

(f) Each notice of a proposed appropriation of a materials site filed by the Department of Transportation under 23 U.S.C. 317 shall be transmitted to the proper district manager. The district manager shall cause a technical examination to be made as provided in paragraph (a) of this section and shall formulate the requirements which the State highway department or its nominee must meet. If the land covered by the proposed appropriation is under the jurisdiction of a bureau of the Department other than the Bureau of Land Management, the district manager shall consult representatives of the bureau administering the land. If the district manager determines, or, in an instance in which the land is administered by another bureau, a representative of that bureau determines that the proposed appropriation is contrary to the public interest or is inconsistent with the purposes for which such land or materials are reserved, the district manager shall promptly submit the matter to the Secretary of the Interior for his decision. In other instances, the district manager shall notify the Department of Transportation of the requirements and conditions which the State highway department or its nominee must meet.

§ 23.6 Basis for denial of a permit, lease, or contract.

An application or offer for a permit, lease, or contract to conduct exploratory or extractive operations may be denied any applicant or offeror who has forfeited a required bond because of failure to comply with an exploration or mining plan. However, a permit, lease, or contract may not be denied an applicant or offeror because of the forfeiture of a bond if the lands disturbed under his previous permit, lease, or contract have subsequently been reclaimed without cost to the Federal Government.

§ 23.7 Approval of exploration plan.

(a) Before commencing any surface disturbing operations to explore, test, or prospect for minerals covered by the mineral leasing acts the operator shall file with the mining supervisor a plan for the proposed exploration operations. The mining supervisor shall consult with the district manager with respect to the surface protection and reclamation aspects before approving said plan.

(b) Before commencing any surface disturbing operations to explore, test, or prospect for materials covered by the Materials Act the operator shall file with the district manager a plan for the proposed exploration operations.

(c) Depending upon the size and nature of the operation and the requirements established pursuant to § 23.5 the mining supervisor or the district manager may require that the exploration plan submitted by the operator include any or all of the following:

(1) A description of the area within which exploration is to be conducted;

(2) Two copies of a suitable map or aerial photograph showing topographic, cultural and drainage features;

(3) A statement of proposed exploration methods, i.e. drilling, trenching, etc., and the location of primary support roads and facilities;

(4) A description of measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, damage to fish and wildlife or other natural resources, and hazards to public health and safety both during and upon abandonment of exploration activities.

(d) The mining supervisor or the district manager shall promptly review the exploration plan submitted to him by the operator and shall indicate to the operator any changes, additions, or amendments necessary to meet the requirements formulated pursuant to

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

January 12, 1977

Memorandum

To: District Mining Supervisor, Pocatello, Idaho
Through: Area Geologist, Pacific Area
Area Mining Supervisor, Alaska-Pacific Area

From: Geologist, Menlo Park

Subject: Geologic report on Phosphate lease I-013731, Champ and Williams Family Partnerships

The following geologic report on Phosphate Lease I-013731 is submitted in response to your request dated Jan. 3, 1977, and received by this office Jan. 4, 1977.

A geologic report is submitted in response to a request by the company to drill ten holes in the SE¼SW¼, sec. 10, T. 9 S., R. 44 E., of their lease (I-013731).

The existence of known phosphate resources has been established in the applied for lands. The subject lands are valuable prospectively for oil and gas but are not considered valuable prospectively for geothermal steam and associated geothermal resources.

The proposed drill holes are located in Dry Basin, a small isolated basin within the northwest-trending Schmid Ridge (see Fig. 1). The area lies easterly about 25 miles (40 kilometers) by paved and secondary roads from Soda Springs and about 19 mi (31 km) northeasterly from Georgetown. Topographic coverage is detailed by the 7.5 minute Dry Valley quadrangle and by the Preston 2° quadrangle.

The geology in the area has been mapped by Mansfield (1927) and by Cressman and Gulbrandsen (1955). The geology as shown on the applicant drilling proposal is an apparent company prepared map for which no credit or references are listed (see Fig. 3).

Rocks exposed in the subject lands consist of phosphatic shale, mudstone and chert of the Permian Phosphoria Formation, and shale, siltstone and limestone of the overlying Triassic Dinwoody Formation. Quaternary alluvium and hillwash cover the lower portions of Dry Basin (company data).

Regional structure is dominated by prominent northwest trending folds that are offset by numerous transverse faults that strike north to northeasterly. Within the subject area the company supplied geologic map shows considerable greater structural data than the published Dry Valley geologic quad (compare Figs. 2 and 3). The proposed drill holes when plotted on the Dry Valley quadrangle are from north to south in Triassic Dinwoody Formation and Rex chert. On the company's map the drill holes are in Triassic Dinwoo Formation, Quaternary alluvium and Rex Chert. On the company map one of the proposed drill holes is located on top of a northeast trending fault.

The proposed drill holes are in an area of low relief and within 600 feet of an indicated secondary road. There are no major streams in the area. As indicated by the company any encountered aquifers in the holes will be properly cemented top to bottom to prevent permanent change in groundwater conditions. Drilling should be conducted when ground conditions permit driving off road with a minimum amount of surface damage.

Analysis of the drill logs should be supplied the Area Mining Supervisor and Area Geologist.

References:

Mansfield, G.R., 1927, Geography, geology and mineral resources of part of southeastern Idaho: U.S. Geol. Survey Prof. Paper 152, pl. 6.

Cressman, E.R., and Gulbrandsen, R.A., 1955, Geology of the Dry Valley Quadrangle Idaho: U.S. Geol. Survey Bulletin 1015-I, pl. 27.

Peter Oberlindacher

Enclosures: Geologic maps
Index map

Figure 1. Location and topographic map of I-013731

Figure 2. Geologic Map, Phosphate Lease I-013731

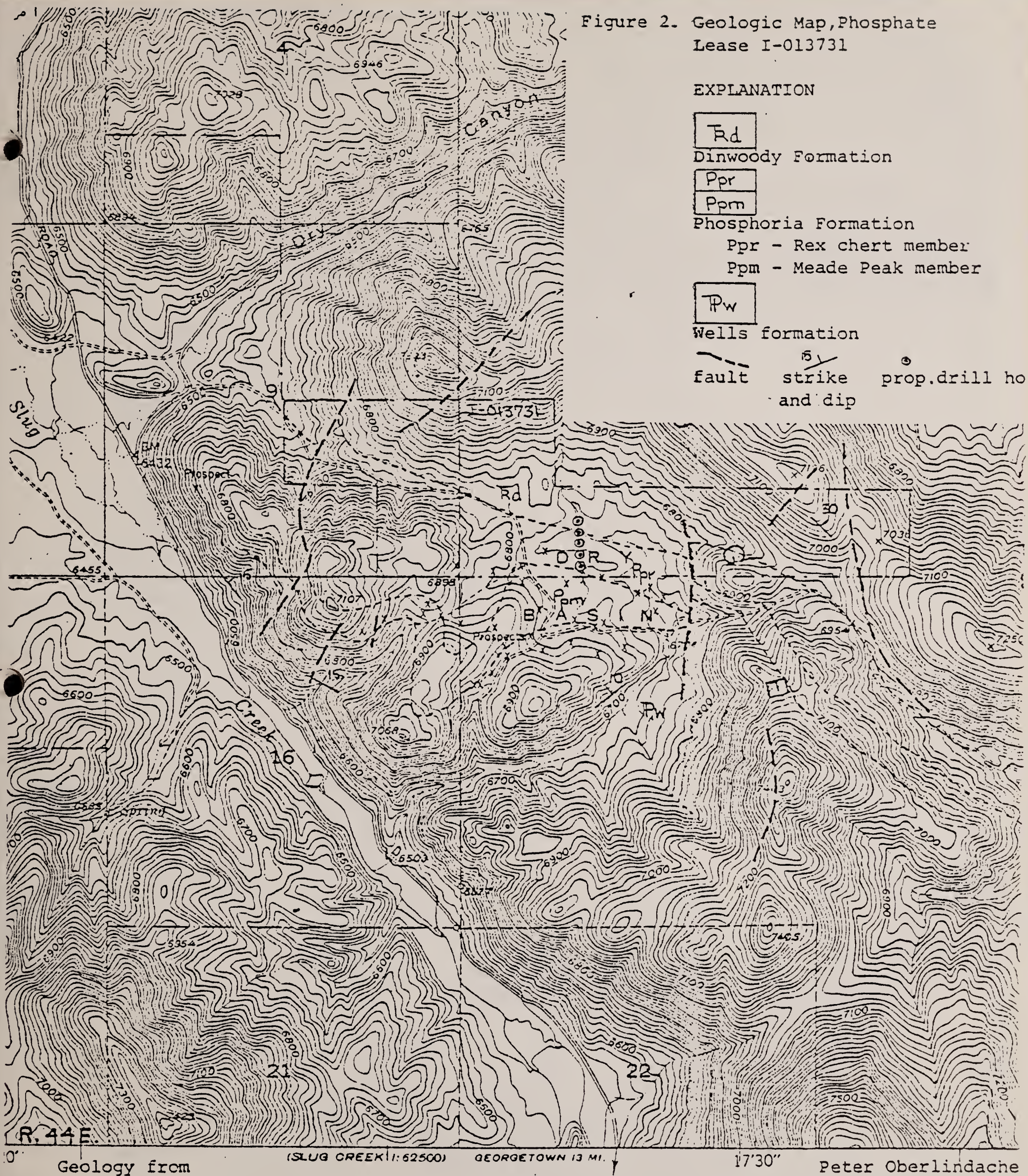
EXPLANATION

Rd
Dinwoody Formation

Ppr
Ppm
Phosphoria Formation
Ppr - Rex chert member
Ppm - Meade Peak member

Pw
Wells formation

fault — strike and dip — prop. drill ho



Geology from USGS Bull. 1015-I

SCALE 1:24000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

Peter Oberlindache
U.S. Geol. Survey
Cons. Division
Office of the Area Geologist


A'
B'
A
B
BASIN
Qal
Rd
PPR
PPU
PPM
PPRU
Pg
IPw
RUBEY TRENCH
DRY BASIN TRENCH
Creek
16
15
7100
7000
6900
6800
6700
6600
6500
7196
7403
7068
6954
6909
6838
7107
7223
7293

21

22

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

February 18, 1975

Memorandum

To: Area Geologist, Pacific Area

From: Geologist, Menlo Park

Subject: Addition of land to Oregon Geothermal Land Classification - Three Forks area, Malheur County

On the basis of a geologic review of the area, certain land in the Three Forks area of Malheur County, Oregon should be added to the Oregon Geothermal Land Classification Map as being valuable prospectively for geothermal steam and associated geothermal resources.

The geology of this area, as mapped by Walker and Repenning (1966), consists of mafic vents and basaltic flows cutting or covering rhyolitic to dacitic welded tuffs and tuffaceous sediments. The mafic vents are composed of basaltic and andesitic agglomerates, breccia, scoria, cinders, flows, and intrusive masses of Tertiary and Quaternary age. The basalt flows are mostly thin, vesicular flows containing some olivine and have been dated as Pliocene.

The general trends of the structure in the area are NE-SW and NW-SE. The mapped faults conform to these directions as well as lineaments through the mafic vents. Also conforming to these trends is a ERTS photo lineament extending from NE to SW (see attached map).

In section 3, T. 35 S., R. 45 E., there is an unnamed hot spring. This spring's temperature was reported by Waring (1965) as being 88-95°F (31°-35°C) and having a flow of 1,000 gpm (3780 lpm). Waring also mentioned that there were 15 springs within a distance of ½ mile (.8 km). Mariner and others (1974) located, sampled, and reported on this spring. They measured a temperature of 34°C with a flow of 4,000 lpm. Subsurface

reservoir temperature based on SiO_2 content is 95°-97° while the reservoir temperature based on the Na-K geothermometer is 44°-100°C.

Also found in this proposed additional area is a maar or coneless volcanic crater located in sections 32 and 33, T. 34 S., R. 45 E. This could be evidence of a fairly recent expression of a subsurface heat source. This maar is now floored with playa deposits.

The following land, totalling approximately 85,760 acres, should be considered as valuable prospectively for geothermal steam and associated geothermal resources and the land classification map changed accordingly:

Willamette Base and Meridian, Oregon

T. 33 S., R. 43 E.
Secs. 25, 36

T. 34 S., R. 43 E.
Secs. 1, 12

T. 33 S., R. 44 E.
Secs. 28 through 33, inclusive

T. 34 S., R. 44 E.
Secs. 1 through 15, inclusive
22 through 27, inclusive
34 through 36, inclusive

T. 35 S., R. 44 E.
Secs. 1, 12, 13

T. 33 S., R. 45 E.
Secs. 20 through 29, inclusive
32 through 36, inclusive

T. 34 S., R. 45 E.
Secs. 1 through 36, inclusive

T. 35 S., R. 45 E.
Secs. 1 through 18, inclusive

T. 33 S., R. 46 E.
Secs. 19 through 22, inclusive
27 through 34, inclusive

T. 34 S., R. 46 E.
Secs. 3 through 10, inclusive
17 through 20, inclusive
29 through 32, inclusive

References:

Mariner, R. H., Rapp, J.B., Willey, L.M., and Presser, T.S., 1974, The chemical composition and estimated minimum thermal reservoir temperatures of selected hot springs in Oregon: U.S. Geol. Survey Open-File report.

Walker, G.W., and Repenning, C.A., 1966, Reconnaissance geologic map of the west half of the Jordan Valley quadrangle, Malheur County, Oregon: U.S. Geol. Survey Misc. Geol. Inv. map I-457.

Waring, G.A., 1965, Thermal springs of the United States and other countries of the World - a summary: U.S. Geol. Survey Prof. Paper 492, 383 p.

William H. Lee

William H. Lee

Attachment

Approved: Henry T. Mullen
Area Geologist, Pacific Area

2/19/75
Date

vent alignments

hot spring
surface T - 34°C
subsurface T - 98°C

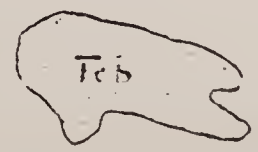
ERTS
photolineament

Conservation Division
Western Region
Office of the Pacific Area Geologist

Geologic map of the proposed addition to the Oregon geothermal land classification map (modified from Walker & Repenning, 1966)

William H. Lee, Geologist
February 18, 1975

mafic vent rocks



olivine basalt flows

Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

March 25, 1977

Memorandum

To: Area Geologist, Pacific Area

From: Geologist, Menlo Park

Subject: Addition of lands prospectively valuable for oil and gas in east-central Idaho

Introduction

The search for petroleum and natural gas resources in southwest Montana has extended into east-central Idaho. Several oil companies will be involved in preliminary seismic exploration for oil and gas during the Spring of 1977 in the Lemhi Valley area (E.T. Rupp, oral comm., February 16, 1977).

The subject lands in east-central Idaho were previously considered unfavorable for oil and gas resources, presumably due to the proximity of the area to the Idaho batholith, in a memorandum by G.H. Horn dated February 15, 1960. However, recent work by Ruppel (1976) presents sufficient evidence to include additional lands in portions of Butte, Clark, Jefferson and Lemhi Counties as prospectively valuable for oil and gas.

Supporting Data

Ruppel (1976) suggests that Paleozoic and Mesozoic sedimentary rocks, including both source rocks and reservoir rocks favorable for the accumulation of petroleum and natural gas, are concealed by the Medicine Lodge thrust system in east-central Idaho, north of the Snake River Plain. The sedimentary rocks overridden by the Medicine Lodge thrust system in this region range in age from Devonian to Cretaceous, and include the petroliferous rocks of the Jefferson Formation of Devonian age and the organic carbon-rich rocks of the Phosphoria Formation of Permian age (Ruppel, 1976, pg. 20).

The leading edge of the Medicine Lodge thrust system extends for over 200 kilometers (125 miles) from the north flank of the Snake River Plain to the west flank of the Big Hole Basin, Montana (Ruppel, 1976, figs. 2 and 3). Movement on the thrust system began in Early Cretaceous (Albian) time and ended by early Eocene time, with most of the 160 km (99 mi) of eastward movement probably occurring in Late Cretaceous and early Paleocene time (Ruppel, 1976).

The lands considered prospectively valuable for oil and gas include areas where Paleozoic and Mesozoic source and reservoir rocks are thought to exist beneath the Medicine Lodge thrust system. According to E.T. Ruppel (oral comm., February 16, 1977), the approximate northern extent of these autochthonous Paleozoic and Mesozoic source and reservoir rocks in the vicinity of the Beaverhead Mountains is Hawley Creek. In the Lemhi Range the northern extent is about 8 km (5 mi) south of the Sawmill Canyon stock (Ruppel, 1976, fig. 2). The southern boundary lies somewhere south of the north flank of the Snake River Plain.

In this determination, an important factor effecting the occurrence of oil and gas is the relationship of intrusive igneous rocks, and associated mineral deposits, to the Medicine Lodge thrust system in east-central Idhao. Ruppel (1976, p. 17) indicates that the emplacement of intrusive igneous rocks and known deposits of metallic minerals near the central part of the Lemhi Range (just northwest of the subject area) is to a large extent controlled by structural features associated with the Medicine Lodge thrust system. This relationship might hold true for the entire thrust belt region. However, the metallic mineral deposits in the southern Beaverhead Mountains (in the Nicholia and Birch Creek mining districts) and in the southern Lemhi Range (the Dome and Hamilton mining districts) are apparently not associated with any exposed stocks of post-Medicine Lodge thrust age. Most of these mineral deposits are located in faults that could reflect leakage from buried stocks deeper in the allochthonous block, or deposition of secondary minerals above a more deeply buried primary sulfide deposit (Ruppel, 1976, p. 18). The granitic Beaverhead pluton, exposed in the southern Beaverhead Mountains, has been dated as Silurian by isotope determinations. This age suggests that the pluton is much older than the igneous intrusive rocks in the central Lemhi Range. Geophysical evidence further implies that it was probably sheared off by the Medicine Lodge thrust and displaced eastward with the enclosing sedimentary rocks and is probably confined only to the allochthonous portion of the thrust (Ruppel, 1976).

Geologic investigations in the subject area have not revealed any conclusive evidence to suggest that source and reservoir rocks have been intruded by igneous bodies to the extent that potential oil and gas resources have been driven off.

Pending further geologic studies in the area it is recommended that the following lands be classified prospectively valuable for oil and gas:

Boise Meridian, Idaho

T. 7 N., R. 27 E.
Secs. 1-3, 10-15, 22-27, 34-36
T. 8 N., R. 27 E.
Secs. 1-3, 10-15, 22-27, 34-36
T. 9 N., R. 27 E.
Secs. 1-18, 22-27, 34-36
T. 10 N., R. 27 E.
All
T. 15 N., R. 27 E.
Secs. 1-3, 10-15, 22-27, 34-36
T. 6 N., R. 28 E.
Secs. 1-18
T. 7 - 10 N., R. 28 E.
All
T. 13 N., R. 28 E.
Secs. 1-3, 10-15, 22-27, 34-36
T. 14 - 15 N., R. 28 E.
All
T. 4 N., R. 29 E.
All
T. 5 N., R. 29 E.
Secs. 1-3, 10-15, 22-27, 34-36
T. 6 - 14 N., R. 29 E.
All
T. 6 - 12 N., R. 30 E.
All
T. 8 - 13 N., R. 31 E.
All
T. 8 - 12 N., R. 32 E.
All
T. 13 N., R. 32 E.
Secs. 2-11, 14-23, 26-35
T. 14 N., R. 32 E.
All
T. 10 - 12 N., R. 33 E.
All

Containing 889,467 acres, more or less.

The revised acreage for lands considered prospectively valuable for oil and gas in Idaho is hereby changed from the previous 24,235,520 acres to 25,104,987 acres as of this action.

Reference:

Ruppel, E.T., 1976, Medicine Lodge thrust system, east-central Idaho and southwest Montana: U.S. Geol. Survey Open-File Report 76-366, 25 p.

Dave Hovland

Approved: _____
Area Geologist, Pacific Area

Date: MAY 6 1977

cc: District Geologist, Los Angeles
Chief, Branch of Mineral and Water Power Classification
RPH/ab
File/ Oil & Gas 5.4
Peter ✓

UNITED STATES GEOLOGICAL SURVEY

CONSERVATION DIVISION

ENVIRONMENTAL ANALYSIS

of a

TRENCHING PLAN,

CLARK AND LEMHI COUNTIES, IDAHO

Prepared and Submitted by

Office of the Pacific Area Geologist

Example of required EA for all
trenching and drilling operations

I. DESCRIPTION OF THE PROPOSED ACTION

II. DESCRIPTION OF THE ENVIRONMENT

NATURAL SYSTEMS

Climate

Physiography

Hydrology

Idaho Phosphate Deposits

Geology

Fish and Wildlife

ARTIFICIAL SYSTEMS

Socio-Economic

Recreation

Cultural Resources

III. PROBABLE IMPACTS OF THE PROPOSED ACTION ON THE ENVIRONMENT

Air Quality

Water Quality

Land Quality

Wildlife

Socio-Economic

Recreation

Scenic Views

IV. ALTERNATIVE ACTIONS

V. UNAVOIDABLE ADVERSE EFFECTS

VI. MITIGATING MEASURES

VII. SHORT TERM VERSUS LONG TERM USE OF THE ENVIRONMENT

VIII. IRREVERSIBLE & IRRETRIEVABLE COMMITMENT OF RESOURCES

IX. REFERENCE

APPENDIX A -- Forest Service letter granting permission to trench at Hawley Creek site

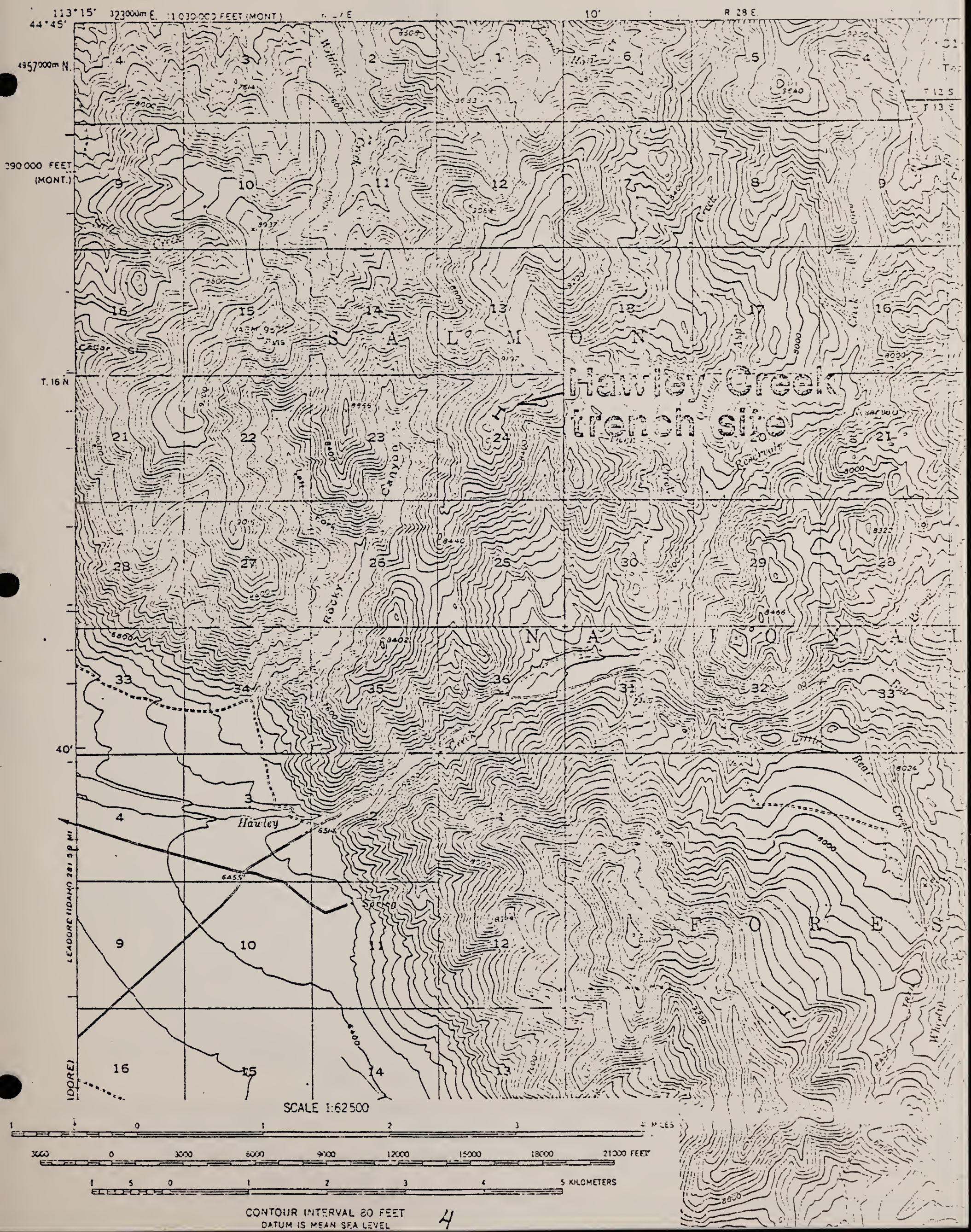
X. DETERMINATION

SUMMARY OF ENVIRONMENTAL ANALYSIS

Conservation Division has proposed to cut three trenches in two different localities in eastern Idaho. Current planning calls for a trench 150 feet long and 15 feet deep to be dug at the Hawley Creek site, NW¼, Sec. 24, T. 16 N., R. 27 E., BM; and two trenches approximately 50 feet long and 15 feet deep at the Snaky Canyon site, SE¼, sec. 21, T. 9 N., R. 32 E., BM. The trench locations are shown on the accompanying maps. This trenching is to be done to increase the geological knowledge and gather information on the quality and structure of the Meade Peak member of the Phosphoria Formation.

As there are existing roads into each site, surface disturbance will be limited to the trenches and excavated material; the disturbed areas would be reclaimed at the end of the sampling program.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



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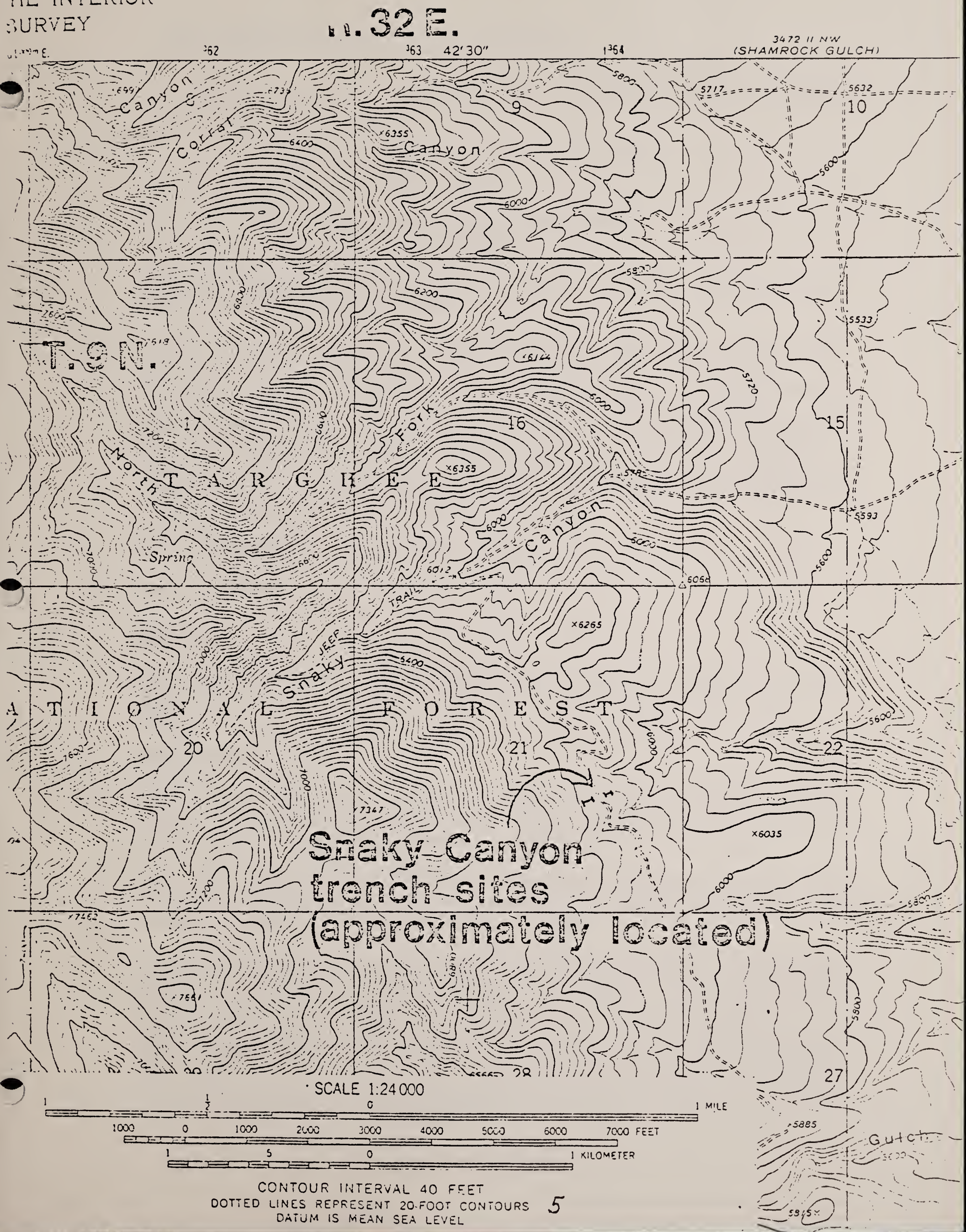

I. DESCRIPTION OF THE PROPOSED ACTION

The purpose of the plan is to sample the Phosphoria Formation and gather geologic information in a relatively unknown area of eastern Idaho. The lands involved are located as follows:

T. 16 N., R. 27 E., BM (Hawley Creek site)
Sec. 24, NW¼ (1 trench)

T. 9 N., R. 32 E., BM (Snaky Canyon sites)
Sec. 21, SE¼ (2 trenches)

These lands are within the Salmon and Targhee National Forests, with both surface and subsurface in Federal ownership.

It will not be necessary to construct roads into these sites as they already exist. The disturbance would then be limited only to the trench sites themselves and the excavated material. The equipment to be used consists of a properly equipped, Forest Service approved, D-7 Caterpillar bulldozer. Once the trenches are opened, selected samples will be taken, approximately 200 pounds in total weight. Once sampling and mapping have been completed at each site, the bulldozer will be used to backfill the trench and replace the topsoil that was stored separately. After the original contours have been reestablished, natural grass seeding will take place.

II. DESCRIPTION OF THE ENVIRONMENT

Natural Systems

Climate

Mild summers and cold winters characterize the region. Much of the 14 inches of average precipitation falls as snow during the winter months; the rest as rain.

Physiography

The Hawley Creek site is located in rolling hill country bounded by Hawley Creek on the south and Rocky Canyon on the west and north. There is an intermittent drainage to the south of the trench site.

The Snaky Canyon sites are located in low rolling hill country bounded on the north by Snaky Canyon and unnamed intermittent drainages on the south. The relief in the area of the trenches is about 400 feet.

Mountain grasses and sagebrush grow on all except sheltered northeast facing slopes, which bears quaking aspen, as well, due to long lived, slow melting snow banks. Topographic coverage of the Hawley Creek site is provided by the 15-minute Morrison Lake quadrangle with a contour interval of 80 feet; and the Snaky Canyon sites are covered by the 7½-minute Snaky Canyon quadrangle with a contour interval of 40 feet. The closest town to the Hawley Creek site is Leadore, about nine miles due west; and the closest town to the Snaky Canyon sites is Dubois, about 25 miles east. Access to each site is by existing roads

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Hydrology

Most of the precipitation sinks into the ground in both areas, with surface drainage not appreciable even during the spring snowmelt runoff. The water table is thought to be well below the proposed bottom of each trench.

Idaho Phosphate Deposits

The Idaho phosphate region covers approximately 10,000 square miles in parts of Bannock, Bear Lake, Bingham, Bonneville, Clark, Fremont, Lemhi, Teton,

and Madison Counties in the southeastern corner of the state. Although the Idaho phosphate region covers the smallest areal extent of any state in the Western Field--only about 10 percent of the total, it has the largest and richest resources and yields the largest production of phosphate rock and phosphate rock products. Most of the area underlain by the Meade Peak phosphatic shale member is within the boundaries of Caribou National Forest; smaller areas lie within the boundaries of Targhee, Salmon, and Cache National Forests and in the Fort Hall Indian Reservation. Only a very small percentage of the total area is private or vacant public lands.

Geology

The Hawley Creek trench site has been mapped at a scale of 1:30,700 by Lucchitta (1966). The trench will be located in a saddle between two low hills in what has been mapped as undifferentiated Park City and Phosphoria Formations. More specifically the southernmost hill is held up by the Tosi Chert Member of the Phosphoria Formation. Figure 1 is a view southward over the trench site to this low hill held up by chert. The Park City and Phosphoria Formations form ledgy cliffs and can be distinguished by their light weathering color. The Tosi Chert Member is located stratigraphically near the top of the Phosphoria Formation. It is characterized by medium-dark-gray to dark-gray massive chert. Below this chert member are very fine-grained phosphatic sandstones and phosphatic siltstones. This unit is more susceptible to erosion and forms the saddle in which the trench will be located. The quality and degree of weathering of this particular unit are unknown and form the object of this trenching program. Figure 2 gives a closer view of the actual trench site. According to the available geologic map and crosssections, there appears to be a large reserve of potentially valuable phosphate rocks and knowledge pertaining to the quality and quantity, as well as structure, stratigraphy, and lithology, needs to be generated in a sampling program such as trenching. There are no known faults in the immediate vicinity of the trench area.

The geology of the Snaky Canyon trench sites is not well known. The rocks in the vicinity of the trench sites are phosphatic shales and sandstones equivalent to the Meade Peak Member of the Phosphoria Formation. These rocks are Permian in age and were deposited in a marine environment and later uplifted, folded, and faulted. One of the principal reasons for trenching at this locality is to gather knowledge concerning a heretofore unreported and unmapped occurrence of Phosphoria Formation. Another reason for trenching here is sample collecting in support of possible future mineral classification.

Fish and Wildlife

Deer are known to summer in the area; grouse are found scattered in the brush. No fish are found, since all the sites are on ridge tops. Soil of the Phosphoria Formation chert units do not generally have enough natural good vegetation cover to support deer herds.

b

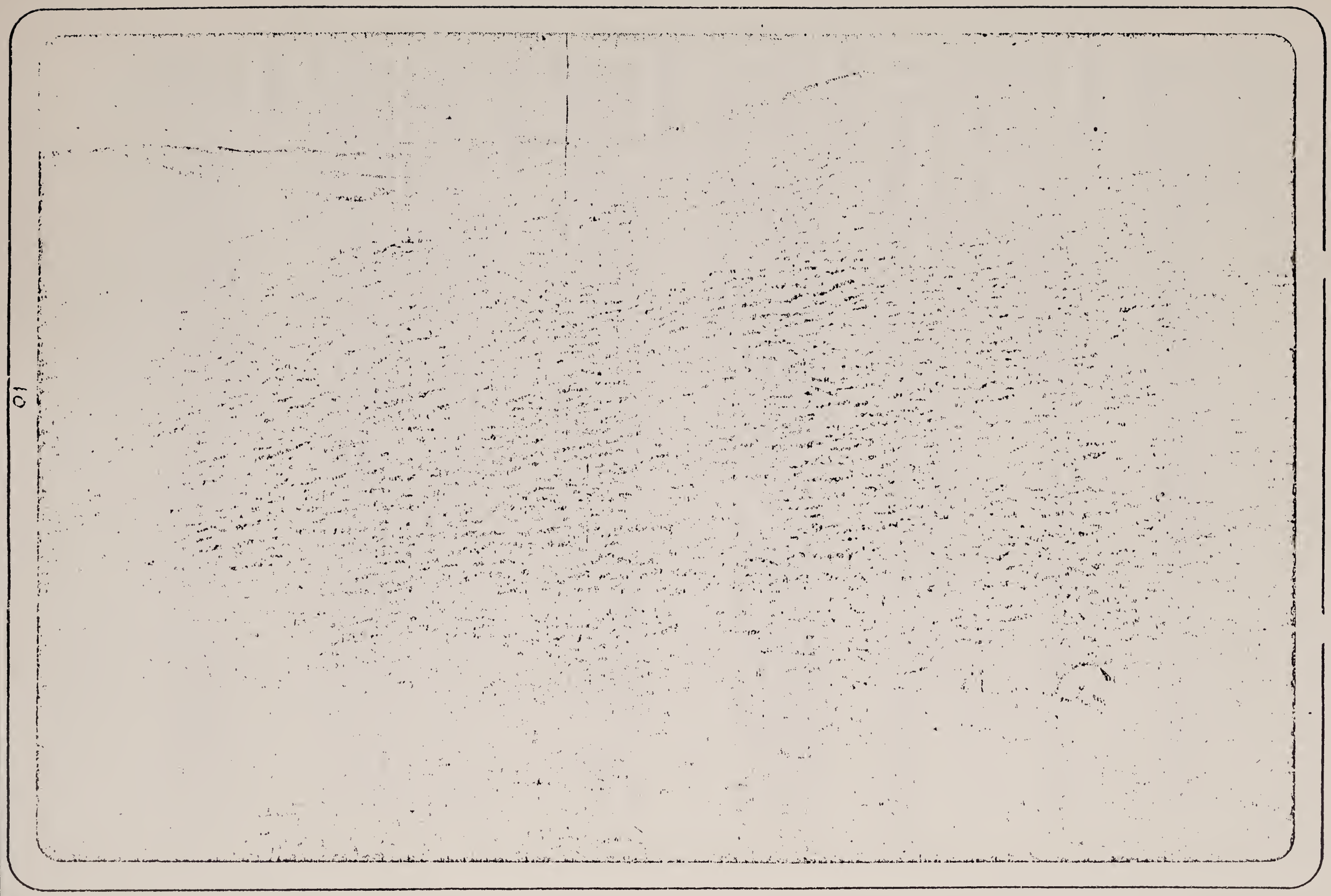

Figure 2. -- Detailed view of Hawley Creek trench site.

ARTIFICIAL SYSTEMS

Socio-Economics

The trenching program will utilize a D-7 bulldozer owned and operated by a local rancher. The program will have no effect on the local economy, except for the rancher.

Recreation

The areas have slight recreational use by deer and grouse hunters, and possibly by snowmobilers during the winter.

Cultural Resources

Neither site is known to have historical or archaeological values.

III. PROBABLE IMPACTS OF THE PROPOSED ACTION ON THE ENVIRONMENT

Air Quality

To some degree, both noise and airborne dust pollution would be caused by the activities of trenching. These impacts would be local, occurring only during the actual operation. The small number of people involved would cause infrequent traffic and the small size of the trenching equipment should reduce the significance of this impact.

Water Quality

No ground water intersection is anticipated in the trenching operations. There are no perennial streams in the immediate vicinity of the trenches. Since no water is to be used in the trenching operations and no ground water is expected, the impact on water quality will be nonexistent.

Land Quality

An increased fire hazard would be created by the bulldozer and the people working at the trench sites. Since the bulldozer is fully equipped with Forest Service approved equipment and by exercising reasonable care, this is not expected to be a major hazard. The use of existing roads will prevent significant increase in erosion. On final abandonment, each trench site will be backfilled, separately stored topsoil replaced, and natural contours restored. The area of each operation will be replanted with native grass seed provided by the Forest Service.

Wildlife

The few birds and animals near the trench sites might be temporarily displaced by the noise and activity at these sites; this impact is not expected to be severe. There should be no long-term displacement of wildlife caused by the program.

Socio-Economic

Since the bulldozer operator is a local operator, there will be a very small impact on the economy of the area. There would be no long-term change in the intensity or character of land use due to this program.

Recreation

There should be little change in the slight present recreational use of the area as a result of this trenching program.

Scenic Views

The impact of trenching activities on the scenic quality is expected to be minimal. There will be some dust associated the opening and backfilling of the trenches but all of the trench sites are away from and out of sight of all main roads.

IV. ALTERNATIVE ACTIONS

Three alternative actions exist to approval of the proposed exploration plan: (1) do not approve; (2) delay approval pending further investigation; (3) or approve with modifications. These alternatives are discussed below:

1. Do not approve

Since trenching is necessary to determine the grade, thickness and degree of alteration of the phosphorite, nonapproval would not allow the assessment of these beds as a phosphate resource.

2. Delay approval of proposal

As no physical work may be performed, except under an approved environmental analysis, delay, if prolonged, could have the same effect as postponing scheduled trenching by another year due to the limited field season under the area's climatic conditions. It is unlikely that new information concerning impacts caused by the trenching program would be developed during a delay.

3. Approval with modifications

The three proposed trenches are the minimum necessary to determine the grade, thickness, and degree of alteration of the phosphorite. The proposed length, depth, and width (about eight feet, the width of a D-7 bulldozer blade) are the minimum dimensions of the trenches that would allow the gathering of the necessary data.

V. UNAVOIDABLE ADVERSE EFFECTS

Because of the nature of the trenching program and its small scale, most impacts would be temporary, minor, and largely avoidable. There would probably be some temporary displacement of wildlife, as well as airborne dust from bulldozer operations, but the severity of these impacts is not expected to be significant.

Although some minor adverse environmental effects might result from this exploration program, the Conservation Division would utilize existing and new technology, knowledge and resources to minimize those impacts which could not be avoided.

VI. MITIGATING MEASURES

A. Access to each of the trench sites is by existing roads. No new roads will be built. Any damage to existing roads caused by the passage of the truck-mounted bulldozer will be repaired.

B. Surface protection would include:

1. Vegetation on existing roads would not be disturbed unless leveling is necessary.

2. No open fires will be permitted. All trash will be hauled from the area to a designated dumping ground.

3. An ABC fire extinguisher will be located at each trench location.

4. Site preparation would be kept at the lowest levels consistent with efficient operation and preservation of the natural environment.

5. At the conclusion of operations at each site, trenches would be backfilled, topsoil replaced, and ground would be shaped to conform to as near the original contour and condition as possible. Reseeding with natural grasses will be conducted.

Little actual surface disturbance except right at the trench sites should take place since there are existing roads and no cross-country travel is necessary. Subsequently, there appear to be few unavoidable adverse effects on the natural environment.

VII. SHORT TERM VERSUS LONG TERM USE OF THE ENVIRONMENT

Considering that the proposed trenching program will be only for a period of two weeks total time for both sites, there appear to be little adverse effects from the short term use with adherence of required precautionary measures. There is no long term use of the environment proposed or required.

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There would be no irreversible or irretrievable commitments of resources resulting from this trenching program since the goal of the program is to gather knowledge and data concerning the structure and stratigraphy and sample collection in the phosphatic rocks of the areas.

IX. REFERENCE

Lucchitta, B. K., 1966, Structure of the Hawley Creek area, Idaho-Montana: Unpub. Ph.D thesis, Penna. State Univ., 204 p.

X. DETERMINATION

Approval of the trenching program does not consitute a major federal action significantly affecting the environment in the sense of NEPA, Section 102(2)c.

_____
Pacific Area Geologist

_____
Date

I concur: _____
Acting Conservation Manager, Western Region

_____
Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

December 9, 1975

Memorandum

To: Conservation Manager, Western Region

From: Area Geologist's Office, Pacific Area

Subject: Comments on preliminary draft, Idaho Phosphate EIS

The following comments are offered in response to your November 26, 1975 memorandum to the Chief, Conservation Division, Environmental Section. In the memo received December 3, 1975 you specifically requested our input to pages 40-43 of Vol. I of the Idaho Phosphate EIS.

We feel our input is relevant and adds useful information to the document. For simplicity we have rewritten the entire mineral resource section that deals with resources other than phosphate. Our comments are incorporated into the original text.

Aside from our input on the non-phosphate mineral resources we feel that the following paragraph should be added on page 16, Vo. I before the heading PERMITS AND LEASES:

> In 1969, a total of 9,867 acres were evaluated by the Geological Survey in the Caribou Range as phosphate lands subject to competitive leasing only. Additional lands are being currently evaluated in southeastern Idaho for a similar designation.

The revision starts with Paragraph 3, page II-40, Chapter II A-2-b, Vol. I of V, Environmental Impact Statement, Development of Phosphate Resources in southeastern Idaho.

Mineral Resources

The principal sources of information regarding the study area's mineral resources in rocks other than the Phosphoria Formation are the reports of: Kirkham (1924), Mansfield (1927), C. Ross (1941, 1959), Vine and Moore (1952), Savage (1961), S. Ross (1968, 1971), and Young and Mitchell (1973).

Geothermal

Thermal springs are widely scattered in southeastern Idaho as described by S. Ross (1971) and Young and Mitchell, (1973). Chemical and geophysical analyses have been conducted on at least 5 springs within the subject area. Surface temperatures of the tested springs range from 25°C to 49°C. See table.

Table*

Spring or Well I. D. number and location	County	Reported depth below ground surface (feet)	Discharge gpm	Surface Temp. °C / Date	Aquifer Temp. °C from Geochemical Thermometer	
					Silica	Na-K-Ca
Bear Lake Hot Springs 15S,44E,13 cca 1S	Bear Lake	--	--	47.5 / 5/9/72	85	230
1N,43E, 9 cbb 1S	Bonneville	--	70	25.0 / 8/10/72	35	190
6S,41E,19 baa 1S	Caribou	--	1,300	42.0 / 8/15/72	70	370
Soda Springs 9S,41E,12 add 1S	Caribou	--	--	31.0 / 8/15/72	80	35
Heise Hot Springs 4N,40E,25 dcb 1S	Jefferson	--	60	49.0 / 7/27/72	80	205

*from Young & Mitchell (1973)

U. S. Geological Survey information indicates that there are lands located in the subject area that are valuable prospectively for geothermal resources. These lands are considered potentially valuable for geothermal exploration.

Oil and Gas

U. S. Geological Survey information indicates that the majority of lands in southeastern Idaho are considered potentially valuable for oil and

gas exploration. 303,000 acres of Federal land are currently under lease, and lease applications have been filed for 155,000 additional acres. Although 11 exploration wells have been drilled in the area no resources of oil or gas have been discovered.

Oil Shale

Oil Shale, other than that described in the Phosphoria, has been discovered only on the bank of Bear River about 4 miles south of Soda Springs, where a flat-lying bed over 4 feet thick disappears under basalt (Winchester, 1923); a sample of the bed yielded 20 gallons of oil per ton of rock.

Coal

Coal occurs in the Bear River Formation of Cretaceous age in the Fall Creek area of the Caribou Range, where a 4-foot interval contains interbedded coal, clay, and limestone. Coal beds also crop out at other localities. The coal is considered too poor in quality and its beds too thin to be of present economic value.

Five mining districts are located within the subject area. The mining districts are: the Bear Lake lead and copper district, the Montpellier copper district, and the Nounan copper district in Bear Lake County; the Mount Pisgah gold district in Bonneville County; and the Willow Creek-Caribou coal district in Bingham and Bonneville Counties, C. Ross (1936).

Of the five districts only the Mount Pisgah district in T. 4 S., R. 44 E. had any significant production. Much gold was taken from placers in Caribou (Pisgah, Bainbridge) Mountain area in the late 1800's, and activity has continued sporadically until recent times. Currently there is some prospecting and exploration activity in the area. Occurrences of lode and placer deposits have been reported in other parts of the EIS area, but the amounts are not significant.

Abundant resources of carbonate rock occur in formations ranging in age from Cambrian to Quaternary. The Monroe Canyon Limestone of Mississippian age is quarried on the north side of Trail Canyon, a few miles east of Soda Springs.

The Swan Peak Quartzite of Ordovician age, an immense silica resource, is quarried about 2 miles north of Soda Springs. This formation is widely distributed in the Soda Springs Hills north of the city and the southern part of the Bear River Range. Other quartz-rich sedimentary rocks are abundant throughout the area, particularly in the Paleozoic rocks, and augment the silica resources.

Road metal, sand and gravel, and building stone are produced from abundant carbonate rock, quartzite, sandstone, chert, basalt, tuff, travertine, and alluvial deposits.

Pumice is widely distributed around Ammon, in the northwestern part of the area, but only small amounts have been mined from beds ranging from at least 60 to 80 feet thick.

Between 1906 and 1925, more than 1,000 short tons of salt were produced from salt deposits along Crow Creek and Stump Creek, near the eastern edge of the area. Production was from saline spring deposits but more recent local oil-exploration drilling revealed that the salt in the springs actually comes from the thick beds in the lower part of the Preuss Sandstone of Jurassic age. Salt deposits formed from the saline springs are not large enough to be economically significant.

The only uranium in the area, besides that in the Phosphoria, occurs in the coal and carbonaceous rocks of the Bear River Formation. In the Fall Creek area, the average uranium content is as high as 0.11 percent; in the top 1 foot of the coal, about 0.045 percent. No uranium production is known.

Small deposits of sulfur, formed from sulfur springs, are located southeast of Soda Springs along the western front of the Aspen Range. Some of these deposits were mined for sulfur in the late 1890's and the early part of the 1900's, but the resource does not appear to be large.

Alluvial clay deposits near Ammon and Bone are used for making bricks.

Gypsum, bentonite, and perlite also occur in the area, but no production is known.

Peter Oberlindacher R. David Hovland

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

December 11, 1975

Memorandum

To: Chief, Conservation Division
Attention: Environmental Section

From: Acting Conservation Manager, Western Region

Subject: Additional geologic data for Idaho Phosphate EIS

Enclosed is a copy of additional data that has been provided by the Area Geologist, Pacific Area office.

We feel that this contribution provides a most acceptable discussion of the mineral resources of the subject area.

We are forwarding a copy of this additional data directly to the Task Force office in Pocatello, Idaho.

Hillary A. Oden

Hillary A. Oden

Enclosure

cc: Area Geologist, Pacific Area (w/encl)
Area Mining Supv., Alaska-Pacific Area (w/encl)
Dist. Mining Supv., Pocatello (w/encl)
Schneider, Idaho Phosphate Task Force (w/encl)

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

December 12, 1975

Memorandum

To: Conservation Manager, Western Region

From: Area Geologist's Office, Pacific Area

Subject: Addendum to mineral resource report for Idaho Phosphate EIS

Our mineral resource report contains Bob Gulbrandsen's original data (1975). We wish to add his name to the list of principal sources of information as shown on the front page of our December 9, 1975 memorandum.

Peter Oberlindacher
Peter Oberlindacher

Dave Hovland
Dave Hovland

cc: Environmental Section
Area Mining Supervisor, Alaska-Pacific
District Mining Supervisor, Pocatello
Task Force - Schneider

Geologic Input to the Susanville - Lakeview
BLM District Offices Environmental Analysis Record

by

William H. Lee

Conservation Division, USGS
Pacific Area Geologist's Office
Menlo Park, California

OREGON

The portion of the Environmental Analysis Record (EAR) area in Oregon is included in the Basin and Range Province. It is an area of major faulting to form horst and graben structures. Warner Valley is one of seven major basin-range-type structural basins in south-central Oregon. Warner Valley is an elongate, undrained basin-type valley that was formed by late Tertiary to Holocene block faulting and is bounded on both sides by large tilted fault blocks (Peterson, 1959).

According to Donath (1962), the late Tertiary basalt flows that cover most of the Oregon portion of the EAR area were subjected to two major sets of faults, one set trending N. 35°-40° W., and the other trending N. 20° E. These sets of faults result in a strong regional rhombic pattern. Warner Valley, the main basin-range structure, trends to the northeast and conforms with basin range development elsewhere. The faults of both sets were contemporaneous in origin and movement occurred concurrently along both sets (Donath, 1962).

The rocks in this EAR area area are tuffaceous sediments, tuffs, extensive basalt flows, andesite flows, and minor intrusive rhyolites of Miocene to Plio-Pleistocene age. The valleys and stream bottoms are filled with Quaternary alluvium, slope wash, and landslide debris. Landsliding is common along the steeper portions of the graben-bounding fault scarps. In the northern portion of this EAR area, there are large accumulations of large complex exogenous domes and related flows and flow breccias of rhyodacitic composition (Walker and Repenning, 1965; Walker, 1963). Coyote Hills, Hart Mountain, and Drakes Peak near the Warner Valley are large silica volcanic centers, characterized by steepsided domes and related viscous flows (Walker and Peterson, 1969). Ancient lake bed sediments occur in isolated playas in this area but not to the extent as in Surprise Valley, California.

Russell (1884) reported ancient beach lines that may be traced continuously in Warner Valley about the borders of the basin at an elevation of 225 feet above the present lakes. These beach lines were unbroken by overflow channels thereby indicating that the valley had interior drainage and no outlet. The present lakes are vestigal remnants of this ancient lake.

There are many geothermal manifestations in Warner Valley. Waring (1965) lists 10 thermal springs in the Warner Valley; however, not all the springs listed are located in the EAR area. That listing is reproduced below:

No.	Name or Location	Temp. °F	Flow(gpm)	Remarks
48	Sec. 16, T. 35 S., R. 26 E. upper Rock Creek 4 miles E. of North Warner Lake	105-115	50	Several springs
48A	Antelope Spring	104	30	Deposit of tufa
49	Hart Mountain Hot Spring, in sec. 7, T. 36 S., R. 26 E., on the N. side of Hart Mtn. about 200 feet below crest	Hot	Small	
49A	Fisher's Spring	144	20	Water smells of H_2S
49B	W. D. Moss Ranch, on W. side of S. Warner Lake	72;83	500;30	2 main and several smaller springs
49C	Charles Crump's Spring	104	5	Deposit of tufa
49D	Warner Valley Ranch	98;107; 164	20;2;10	Deposit of siliceous sinter
50	Adel Hot Spring in sec. 23, T. 39 S., R. 24 E., 1 mile E. of Adel P. O.	160	20	Water smells of H_2S
51	Houston Hot Spring in sec. 27, T. 40 S., R. 24 E., 3 miles E. of Warner Lake P.O.	160	5	Deposit of siliceous sinter

Fisher Hot Spring, in the NW¼NW¼NW¼, section 10, T. 38 S., R. 25 E., has a surface temperature of 68°C and an estimated subsurface reservoir temperature of about 123°C (Mariner and others, 1974). Fisher Hot Spring issues from Quaternary alluvium and Miocene to Pliocene olivine basalt.

Crump Spring in the NE¼NE¼, section 4, T. 39 S., R. 24 E., has a surface temperature of 78°C and an estimated subsurface reservoir temperature of 144°C (Mariner and others, 1974). Crumps Spring also issues from Quaternary alluvium and Miocene to Pliocene olivine basalt.

In 1959, Nevada Thermal Power Company drilled a hole 1,684 feet deep near the west bounding normal graben fault in SW¼, section 34, T. 38 S., R. 24 E. The well was tested and abandoned due to the low bottom hole temperature of 170°F. However, temperatures of 230°-250°F, were recorded at 660 feet depth (Peterson, 1959). The well later began erupting steam and hot water. Tufa, sinter mounds and other small hot springs scattered for 2 miles along a narrow elongate northeast trending zone indicate thermal activity along a fault zone (Godwin and Peterson, 1969).

Extinct hot springs are indicated by low mounds of calcareous and siliceous tufa, especially at the north edge of Pelican Lake. Former sites of hot springs are indicated by local mounds of white to light-gray siliceous sinter and calcareous-coated pebbles and boulders within the valley-filling alluvium (Peterson, 1959).

There has been no reported or observed earthquake activity in this area; however the existence of microseismic activity related to geothermal resources is a very strong, but unstudied, possibility.

NEVADA

The portion of the Environmental Analysis Record (EAR) area in Nevada is included in the Basin and Range Province. Little has been published about this portion of Nevada. The main geologic feature is Long Valley, a typical basin-range graben valley. The adjacent Hays Canyon Range is another major feature and is a horst. Probably the most unique geologic feature of this portion of Nevada is a Oligocene strato-volcano that has been dissected by Hays Canyon in T. 39 and 40 N., R. 18 and 19 E. The volcano served as a source for the rocks now mapped as the South Willow Formation (Bonham, 1969).

Long Valley is a large north-south trending elongate depression formed in part by faulting on the northwest and northeast sides, and in part by downwarping on the southeast side. An inferred covered basin-range high angle normal fault is projected as bounding the valley on the west (Bonham, 1969). The range northeast of Long Valley is a tilted fault block bounded by northeast trending high angle normal faults. The basin in which Massacre Lake is located is formed by a synclinal bend related to tilting (Bonham, 1969). The Hays Canyon Range is a complexly faulted horst between the Surprise Valley graben on the west and the Long Valley graben on the east. Most of the faults mapped in the range are north-south trending high angle normal faults but in the northern portion of the range a set of faults trending northwest-southeast is predominent.

The rocks in the Nevada portion of the EAR Area are mostly volcanic in origin. There are olivine basalt flows of upper Miocene and Pliocene age; Miocene sediments of the High Rock sequence and rhyolites of the Canyon

Rhyolite. Miocene basalt and andesite flows and breccias are common. The High Rock sequence as mapped by Bonham (1969) includes diatomite, shale, mudstone, sandstone, basalt lapilli tuff, and agglomerate, sodic rhyolite ash-fall tuff and welded ash-flow tuffs and restricted flows of sodic rhyolite and basalt. The Canyon Rhyolite includes flows, domes and subordinate welded ash-flow tuffs of soda rhyolite. The Oligocene South Willow Formation has rocks derived from the old volcano that are basalt, andesite, and dacite flows, agglomerates, mudflow breccia and associated intrusive phases.

There are Pleistocene to Holocene landslides in this area including a very large one in T. 41 and 42 N., R. 18 E., in the Hays Canyon Range. Landsliding has occurred wherever resistant basalt flows overlie softer tuffs and sediments. Rapid fault uplifting exposes the softer rock to erosion, resulting in oversteepening and extensive landsliding. The valleys are filled with lascustrine sediments, alluvial fan material, talus, and playa sediments.

Russell (1884) stated that Long Valley was occupied by an ancient lake concurrent but not contiguous with Pleistocene Lake Lahontan. That lake was about 250 feet deep as evidenced by elevated shorelines. The ancient lake is represented by modern alkaline pools and playas such as Alkali Lake, Massacre Lake, and others.

Geothermal activity in this portion of the EAR area is relatively meager. Waring (1965) lists only four hot springs in the area:

No.	Name or Location	Temp. °F	Flow (gpm)
35A	Hill's Warm Spring in sec. 18, T. 49 N., R. 20 E., 10 miles N. of Vya	83	10
35B	Hill's Spring, in sec. 11, T. 43 N., R. 19 E., 5 miles N. of Vya	66	8
35C	Twin Springs, in sec. 4, T. 42 N., R. 19 E., at Vya	70	200
36	T. 38 N., R. 18 E., at south end of Surprise Valley	Hot	?

Spring numbers 35A and 35B issue from alluvium, number 35C issues from Pliocene lake beds, and number 36 issues from Tertiary lava.

There have been no reported earthquakes in this portion of Nevada, probably due to scarity of population. However, two epicenters of earthquakes with

magnitudes of 5.0 to 5.9 have been located south of the EAR area (Slemmons and others, 1965).

The Lone Pine mercury mining district is located within the EAR area. This district is located on the south slope of Bald Mountain, an island-like mass of Miocene andesitic and rhyolitic rocks that are locally silicified (Bonham, 1969). It might be noted that in other places throughout the west, geothermal potentials are linked to cinnabar mineralization in silicified rhyolites. However, there is no indication that this is true in the Lone Pine district. The only other mineral occurrence in this area is a diatomite deposit near Fortynine Camp in T. 43 N., R. 18 E.

CALIFORNIA

The California portion of the Environmental Analysis Record area is included in the Basin and Range Province. The main geologic features in this area are the uplifted Warner Range horst and the Surprise Valley fault and attendant graben. Two volcanic centers have been mapped in the Cedar Pass area of the Warner Mountains (Duffield and Fournier, 1974).

The Warner Range has been uplifted at least 5,500 feet in relation to Surprise Valley and possibly as much as 11,000 feet total (Macdonald and Gay, 1966; Duffield and Fournier, 1974). The Surprise Valley graben has been filled with up to 7,000 feet of sediments shed from the adjacent mountains. Within the area of the EAR, the faulting is in two directions; north-south and N. 40° W. (Gay and Aune, 1958). Duffield and Fournier (1974) have mapped two main NW-SE structures through this area. One, the Fandango Fault Zone, forms Fandango Valley and continues across Goose Lake into Oregon. The other structure, actually a fault zone - volcano lineament, extends from the Hays Canyon volcano through the volcanic centers at Cedar Pass and on westward to Round Mountain and Blue Mountain. The mapped geology (Gay and Aune, 1958) does not suggest this lineation, however. Some faults within Surprise Valley have been mapped by geologists of the California Division of Mines and Geology on the Alturas sheet (Gay and Aune, 1958), and by Ford and others (1963). Many faults have been inferred from detailed gravity surveys by Ford and others (1963).

Uplift of the Warner Range began in the mid-Tertiary (Gay, 1959). More specifically, radiometric dating indicates that faulting began no longer than 15 million years ago (Duffield and Fournier, 1974). There is some evidence for recent faulting by fresh fault scarps of 20 to 50 feet in height truncating alluvial fans, and cutting across elevated lake terraces (Russell, 1884).

The Warner Range consists mainly of layered andesite pyroclastic rocks-tuff breccias, agglomerates with intermingled flows. At the northern end of the range, a series of rhyolitic rocks is present as flows and shallow intrusions into the andesites (Gay, 1959). From Fandango Pass southward, the range is underlain by 10,000 feet of sedimentary and volcanic rock. The

basic lithologic sequence in the southern portion of the range is a thick andesite series composed of pyroclastic material followed by a relatively thin but extensive basalt flow and later by local accumulations of rhyolite and obsidian. Basically the stratigraphy of the Warner Range and the Hays Canyon Range are quite similar, a thick andesite series, mostly pyroclastic, overlain by basalt (Russell, 1927).

Surprise Valley, east of the main graben-forming fault, consists of lacustrine and fluvial sediments, alluvium, talus and landslide debris. There are three small intrusive bodies in the middle of the valley southeast of the Upper Alkali Lake. These intrusives appear to be related to the faulting in this portion of the valley. Also located in the valley are areas of dune sand and saline lake deposits.

Russell (1884) applied the name Lake Surprise to that body of water that filled Surprise Valley during the Pleistocene. Lake Surprise was contemporary but not contiguous with Pleistocene Lake Lahontan, located some 35 miles to the south. Old levels of Lake Surprise are marked by truncated spurs, wave-cut terraces, and sea cliffs. The most conspicuous depositional features are old high-gradient deltas at mouths of the larger canyons (Russell, 1927). The highest beach line throughout the valley is at an elevation 550 feet above surface of lake beds. Lake Surprise had an overflow channel southward into Duck Flat. There is evidence that the ancient lake had at least two high-water stages seperated by a time of aridity and dessication (Russell, 1884).

There are numerous hot springs and other surface geothermal manifestations in Surprise Valley. Waring (1965) lists twelve thermal springs in the valley. That list is reproduced in part below:

No.	Name or Location	Temp. °F	Flow(gpm)	Remarks
12	Near Bidwell Creek, 1 mile NW of Fort Bidwell	97-108	75	5 springs
13	Boyd Spring, on E. side of Upper Lake, 12 miles SE of Fort Bidwell	70	1,000	
14	Near SW side of Upper Lake, 4 miles N. of Lake City	120-207	100	Several springs at site of mud eruption of 1951.
15	Near S. end of Upper Lake 12 miles NE of Cedarville	170-182	80	4 springs
16	Sec. 12, T. 43 N.,R. 18 E., near N. end of Middle Lake, 12 miles NE of Cedarville	140-149	225	3 springs

No.	Name or Location	Temp. °F	Flow(gpm)	Remarks
17	Leonard Springs, in sec. 7, T. 43 N., R. 17 E., 11 miles NE of Cedarville	150	50	3 springs
18	Sec. 1, T. 42 N., R. 16 E., and sec. 6, T. 42 N., R. 17 E., 5 miles E. of Cedarville	130	500	5 main springs
18A	Cedar Plunge, 5 miles NE Cedarville	180;208	115	2 wells
19	Benmac Hot Springs, in sec. 18, T. 42 N., R. 17 E., 5 miles E. of Cedarville	120	200	
20	Menlo warm baths, in sec. 7, T. 39 N., R. 17 E., 5 miles SSE of Eagleville	117-125	425	5 springs
21	Near SW side of Lower Lake, 8 miles SSE of Eagleville	120	100	
22	Bare Ranch, 12 miles SSE of Eagleville	70	5	

South of Eagleville, many large hot springs issue from immediate escarpment of a branch of the Surprise Valley Fault. Farther north, hot springs are located out in the valley in distinct relationship to lines of recent displacement (Russell, 1928). Russell (1884) felt that the high temperature of many of the springs that come to the surface along lines of recent displacement were due to heat produced by the arrested motion of the fault blocks. The current thinking, at least in Surprise Valley and the majority of geothermal areas in the west, is that the elevated temperatures are due to volcanism or the presence of a shallow magma body (White, 1955). Duffield and Fournier (1974) summed up geothermal conditions as 1) hot springs structurally controlled and localized along the Surprise Valley fault; 2) with one exception, hot springs no farther than 3 miles from rhyolite flows or plugs; and 3) greatest number of hot springs, representing the hottest surface water temperatures, associated with youngest looking rhyolite-obsidian bodies.

In March, 1951, several hot springs erupted as mud volcanoes in sections 23 and 24, T. 44 N., R. 15 E. The eruption consisted of clouds of steam,

gases, and mud debris rising several thousand feet in the air and scattering particles over several miles. According to White (1955), 20 acres or more was involved and at least 6 million cubic feet or 300,000 tons of mud was affected by the eruption. Temperature of the hot springs in the area of the eruption ranged from 120° to 207° (Waring, 1965). Magma Power Company has completed four drill holes in or very near the area of the eruptions and have found hot water that will flash to steam (320°F). Nothing has been done in terms of power generation as of this date.

Russell (1928) reports that some of the early residents of Surprise Valley felt the 1906 earthquake of San Francisco, the 1915 earthquake of Pleasant Valley, and the 1918 earthquake near Susanville. No recent epicenters have been reported in Surprise Valley although reported recent faulting and thermal activity would indicate the potential for seismic activity.

Other mineral commodities in this area include an old salt works near Cedarville that operated on a zone of thin, relatively pure salt layers a few feet below the present surface of the valley center (Russell, 1927; Gay, 1959).

Summary and Conclusions

Surprise Valley is an elongated graben bounded on the west by the Warner Range and by the Hays Canyon Range on the east. Several cross faults connect the two major basin-range fault systems. Hot Springs are located along a discontinuous north-south trending fault on the western margin of Surprise Valley.

Warner Valley is near the northern limit of the basin-range province. This long, undrained graben valley has resulted from late Tertiary to Holocene block faulting and is bounded on both east and west by large tilted fault blocks.

Long Valley, trending north-south, is formed in part by faulting on the northwest and northeast sides, and by down-warping on the southeast side. An inferred basin range fault is projected on the west side of the valley.

The geologic hazards involved in the area of the EAR are primarily landsliding. Several landslides appear on the geologic map and the potential for others exist wherever oversteepening of slopes exist. Potential geologic hazards connected with geothermal development are land subsidence over depleting reservoirs and microseismic activity related to movement of thermal waters. Land subsidence can be mitigated by reinjection of the thermal waters.

Based on surface manifestations, the geothermal potential for both Warner Valley and Surprise Valley is great, but Long Valley would require further exploration due to the lack of data. Impact of surface exploration for

geothermal resources would be minimal, but developmental impact would be considerably greater.

An update of the classification of the public lands is attached in the form of two maps showing the Crump Geyser KGRA and competitive interest area as determined by BLM, Portland; and the Lake City KGRA with an unofficial competitive interest area. The competitive interest areas, determined in accordance with 43 CFR 3200.0-5(k)(3), will be used in formulating additions to the present KGRA as time permits. Also attached is a composite geologic map of the EAR area.

References:

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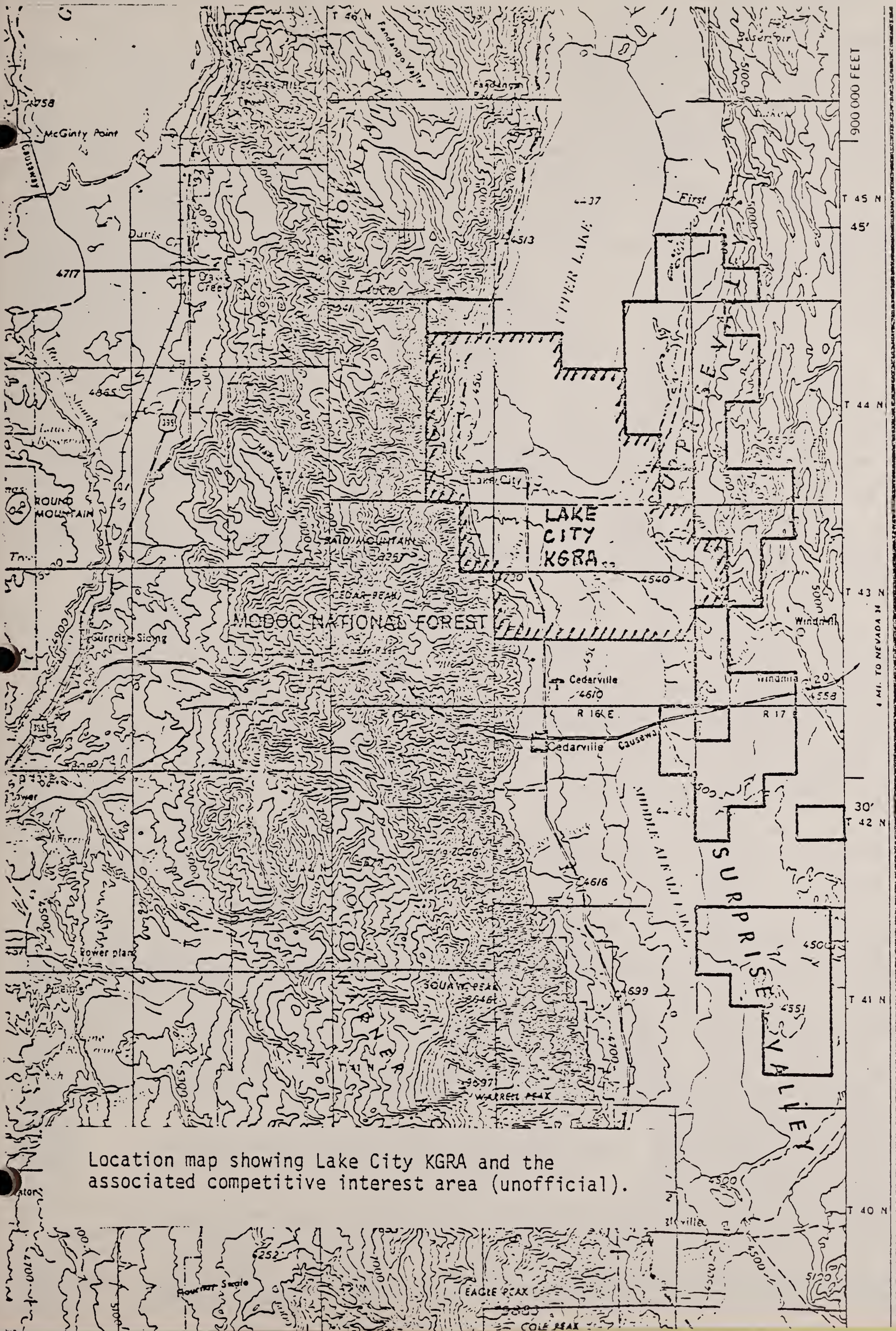

Location map showing Lake City KGRA and the associated competitive interest area (unofficial).

Location map showing Crump Geyser KGRA and the associated competitive interest area.

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UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY -- CONSERVATION DIVISION

PORTLAND, OREGON

TUMBLE LAKE PUMPED-STORAGE SITE

OREGON

Administrative Report

By

W. H. Lee and L. O. Moe

1975

Contents

Illustrations

INTRODUCTION

Electrical resource studies indicate that pumped-storage generation offers the most promising source for meeting future peak electrical power requirements in the Northwest. Although the energy consumed by pumping is about one and one-half times the amount generated, pumped-storage power is justified by the economic value of peak energy. Low-cost, off-peak energy is stored in a pumped-storage system until needed during peak-load period. Pumped storage can operate on a seasonal, weekly, or daily cycle. In a weekly cycle, storage equivalent to at least 14 hours of operation at full capacity is recommended. During the generating period, the plant is operating at full capacity for only a short time, the peak hours each weekday. The off-peak pumping and the carryover storage are sufficient to meet the daily peak generation.

In selection of a site, two similar sets of criteria established by the Corps of Engieers (COE) and the Federal Power Commission (FPC) are used. The main rules are: (1) sites capable of at least 1,000-megawatt development; (2) reservoir of sufficient capacity to generate continually for 14 hours at full capacity; (3) for plant size greater than 3,000 MW the maximum allowable drawdown would be limited to 160 feet (48.8 m) (4) penstock diameters ranging from about 20 (6.1 m) to 40 feet (12.2 m) with maximum flow velocities of 16 (4.9 m) to 20 feet (6.1 m) per second; and (5) penstock length between upper and lower reservoirs of not more than 15 times the head (COE 1972), (FPC 1973).

One of the primary functions of the Conservation Division of the U. S. Geological Survey is to classify federally-owned land that has water

resource value. In late June 1973, two Conservation Division personnel, William H. Lee, Geologist, and Loi O. Moe, Civil Engineer, made a field reconnaissance of the Tumble Lake pumped-storage site in the North Santiam River basin. The prime objective of this field study was to observe the geologic, topographic, and hydrologic feasibility of the dam, reservoir, and penstock areas. Results from this study will be used to determine whether classification of the land involved is justified.

This report discusses two alternative developments of the site: (1) with drawdown limited to 80 feet and (2) with 2,000 acre-feet of dead storage in the upper pool. Providing 2,000 acre-feet of dead storage would permit 155 feet (47.2 m) of drawdown. Calculations were based on 100 percent efficiency and off-peak pumping energy is assumed to be available. A detailed economic analysis was not made.

LOCATION AND GENERAL DESCRIPTION

The Santiam River drains an area of about 1,827 square miles (4,732 km^2) about 70 percent of which is forested. Timber and agricultural products are the driving forces of the basin's economy. The Santiam River is a major tributary to the Willamette River entering from the east at river mile 109 about 10 miles (16.1 km) downstream from Albany. The North Santiam and South Santiam Rivers join to form Santiam River upstream from the town of Jefferson. Water quality of the North Santiam River is excellent and is the principal water supply for the city of Salem. Great amounts of this water are used by the canning industry. Detroit Dam and the Big Cliff Reregulating Dam are the only major hydroelectric developments in this subbasin. The project is also used for flood control, irrigation, and streamflow improvement, and is a popular recreation area in the Willamette valley.

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Breitenbush River joins the North Santiam at river mile 68, and is the principal tributary flowing into Detroit Reservoir. There is only one small hydroelectric development on this stream. It is privately owned with a total output of 10 kilowatts and is the power supply of the Breitenbush Hot Springs resort area. The Tumble Lake pumped-storage site in this part of the North Santiam River basin meets the criteria established by the COE and the FPC.

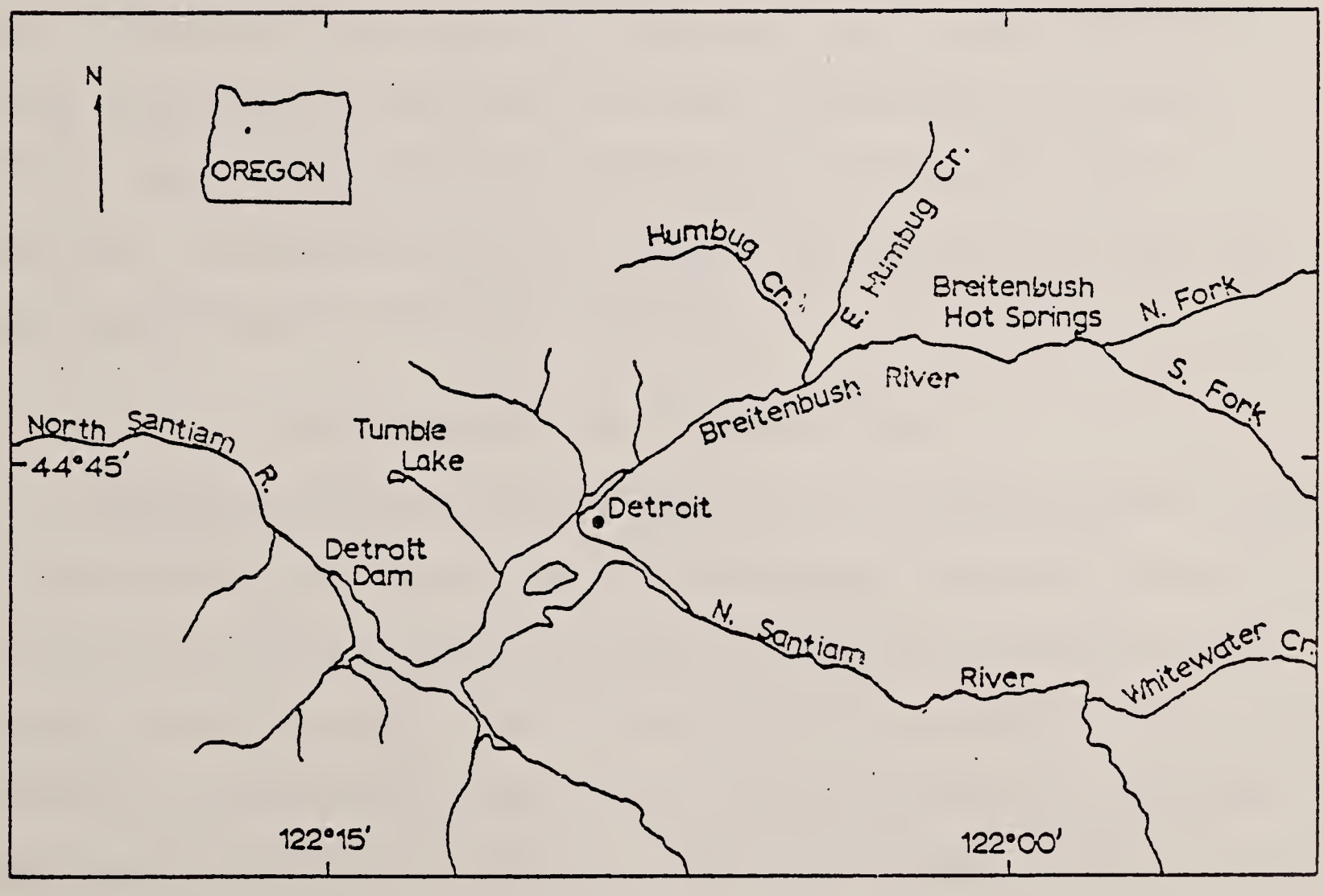


Figure 1.--Location map

WATER SUPPLY

One unique feature of pumped-storage is that the water supply for the upper reservoir is independent of natural inflow. The main supply is through pumping from the lower reservoir.

The National Oceanic and Atmospheric Administration operates a climatological station in the city of Detroit. The arithmetic average precipitation at this station for the years 1938-1971 is 83 inches (211 cm) half of which occurs in the winter months November through March. The average annual snowfall at Detroit is about 60 inches (152 cm), but the snow remains on the ground at this low elevation only a short time. At the high elevations in the vicinity of the site, precipitation is probably greater and some snow might remain on the ground as late as July. Because the drainage area of the upper site is small, the total annual precipitation contributes only about three percent of capacity of the reservoir and is not considered as part of the water used in operation. Precipitation might be regarded as balancing the evaporation and seepage losses of the upper reservoir.

PHYSICAL CHARACTERISTICS OF THE SITE

Tumble Lake.--Pumped-storage site is in the Willamette National Forest in the headwaters of Tumble Creek which discharges into Detroit Reservoir. The lake has a surface area of 22 acres (8.9 ha) and is accessible by a steep, narrow foot-trail. The altitude of the lake as shown on the Geological Survey Battle Ax and Detroit 15-minute topographic quadrangle maps is about 3,640 feet (1,109 m). A dam at the outlet of the lake would create the upper reservoir.

The existing Detroit Reservoir will serve as the lower pool for the Tumble Lake site. The Detroit Dam is located at river mile 61 on the North Santiam River. The reservoir has a total storage of 458,600 acre-feet ($5.66 \times 10^8 m^3$) with usable storage of 343,600 acre-feet ($4.24 \times 10^8 m^3$) between the normal pool altitude of 1,569 feet (478 m) and 1,425 feet (434 m). The gross head is 363 feet (110 m) between the normal pool and the tailwater altitude of 1,206 feet (368 m). Installed capacity is 100,000 kilowatts in two 50,000 kilowatt units.

PLAN OF DEVELOPMENT

Two alternative plans are discussed: Tumble Lake provides the upper storage reservoir in each plan. A 195-foot (59 m) dam to an altitude of 3,835 feet (1,169 m) will store 22,000 acre-feet ($2.71 \times 10^7 m^3$) not including the natural lake storage. The penstock would be located underground in the ridge northwest of Whitman Creek, and would be about 10,000 feet (3.048 m) long horizontally. The economic aspects of power and the impact on recreation at the lower pool would dictate the selection of the operation pattern of the site.

One plan would allow an 80-foot (24.4 m) drawdown providing usable storage of 13,400 acre-feet ($1.65 \times 10^7 \times m^3$). The discharge rate of 11,580 ft^3/s (328 m^3/s) and the average head of 2,230 feet (680 m) could produce 2,200 megawatts of peaking power for 14 hours of continuous operation. One 28-foot (8.5 m) diameter penstock would carry the required discharge and remain within the desired velocity limitation of 20 ft/s (6.1 m/s). The other alternative is to provide 2,000 acre-feet ($2.5 \times 10^6 m^3$) of dead

storage. The remaining 20,000 acre-feet ($2.5 \times 10^7 m^3$) is usable storage. The discharge rate of 17,290 ft^3/s (490 m^3/s) and an average head of 2,200 feet (671 m) would be capable of producing 3,200 megawatts of peak power for 14 hours of continuous operation. To staisfy the velocity limitation of 20 ft/s (6/1 m/s), one 33-foot (10 m) diameter penstock would meet criteria.

Refilling the upper reservoir with 13,400 acre-feet ($1.65 \times 10^7 m^3$) would result a 5-foot (1.5 m) drawdown on the lower pool. Pumping 20,000 acre-feet ($2.5 \times 10^7 m^3$) to refill the upper pool would require an 8-foot (2.4 m) drawdown on the Detroit Reservoir.

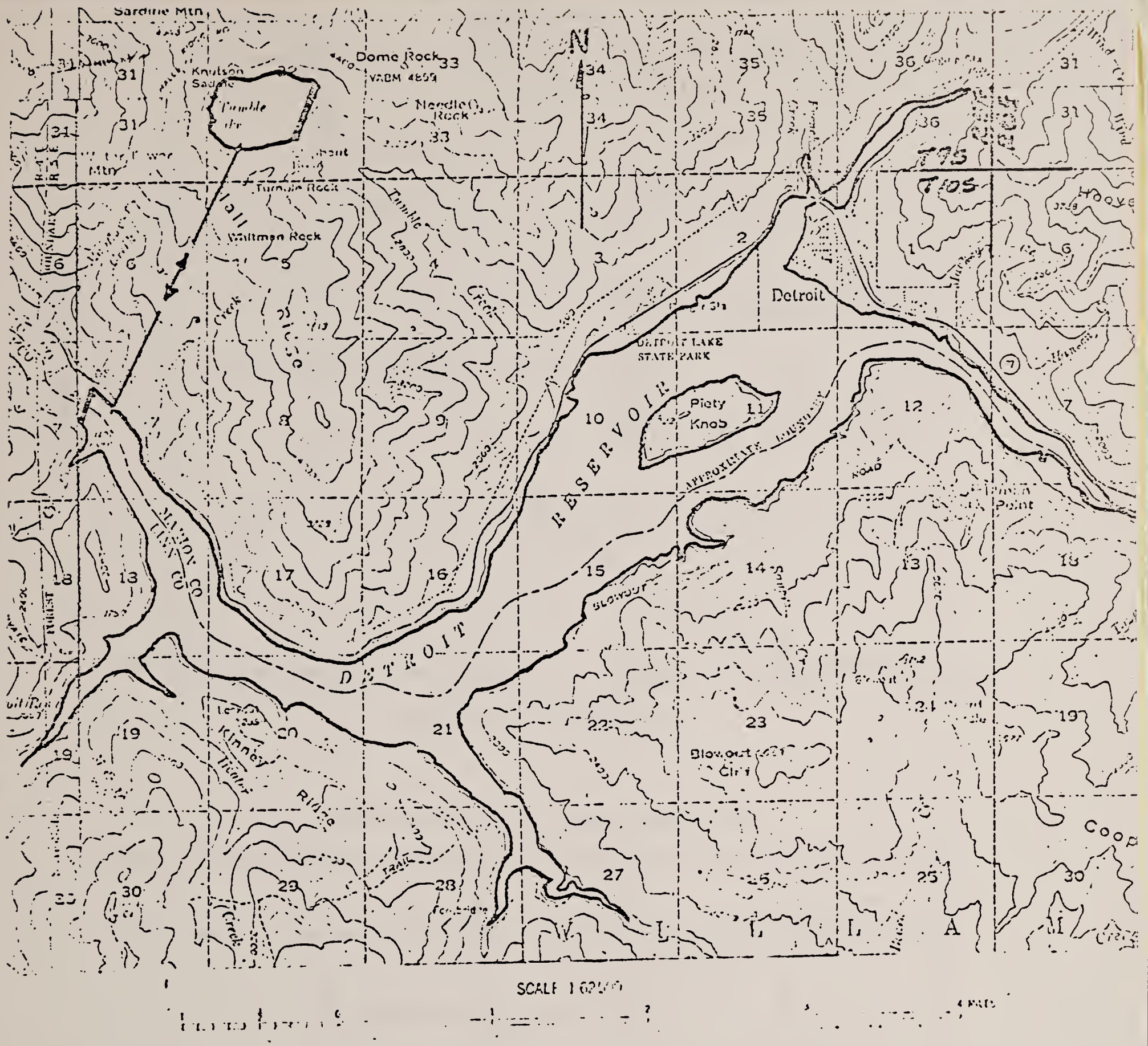
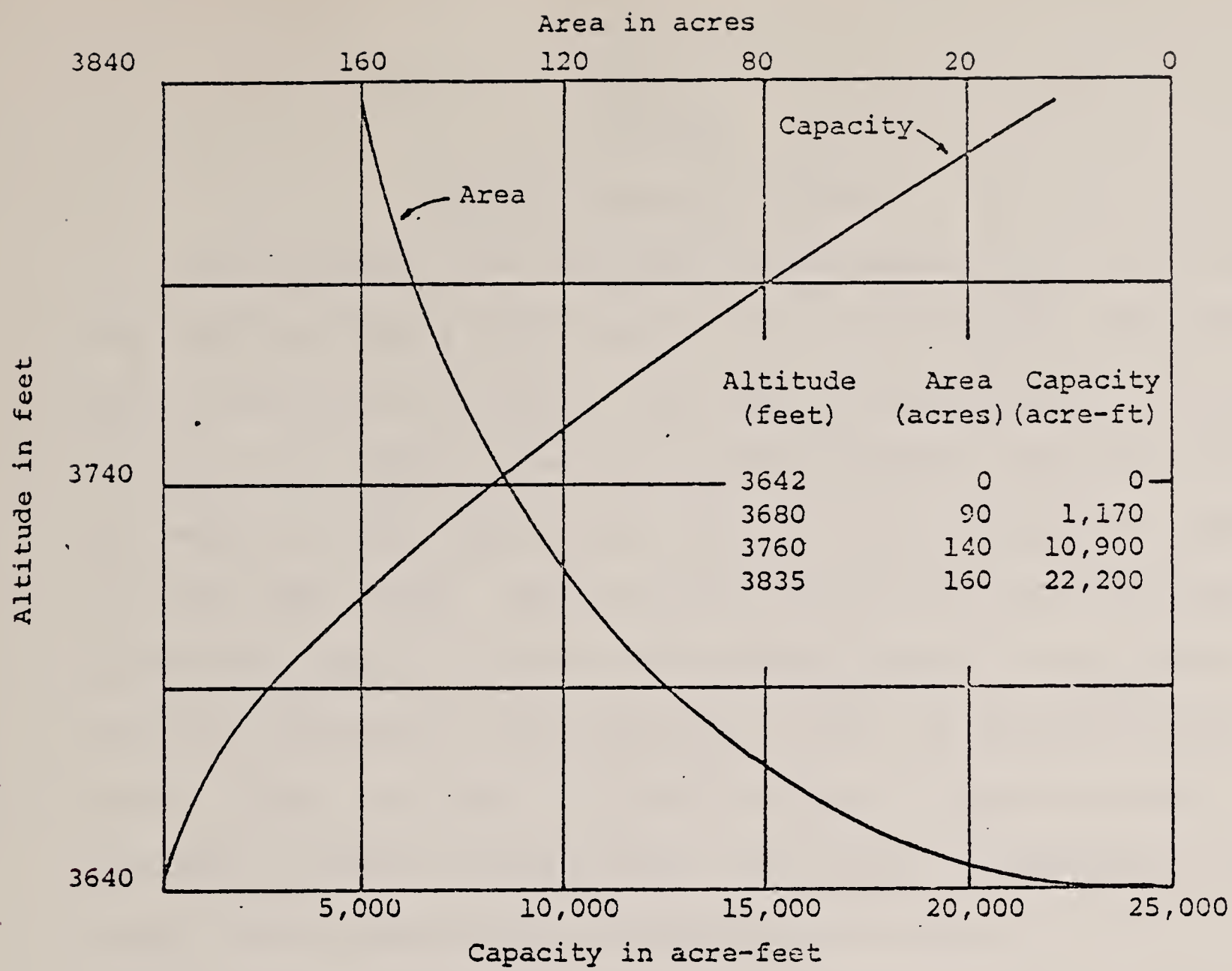


Figure 2.--Tumble Lake pumped-storage site

Approx. penstock length: 10,000 ft.
Average static head: 2,200 ft.
Operating cycle: weekly
Max. plant cap. (100% eff.): 3,200 MW

	Upper	Lower
Water surface	3,835 ft.	1,569 ft.
Dam height	195 ft.	363 ft.
Approx. dam length	1,800 ft.	1,580 ft.
Total capacity	22,000 a-f	458,600 a-f
Max. drawdown	155 ft.	8 ft.



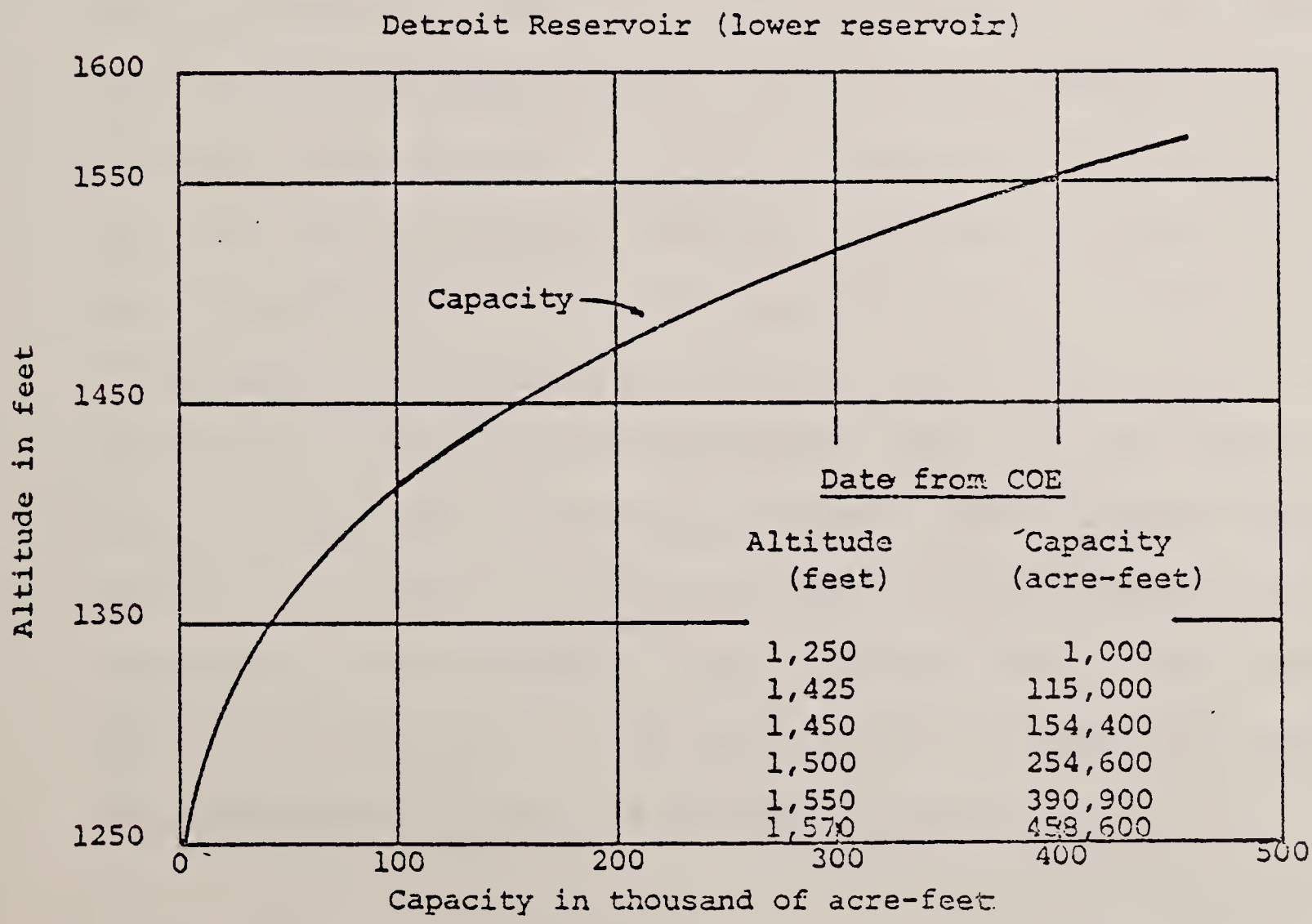


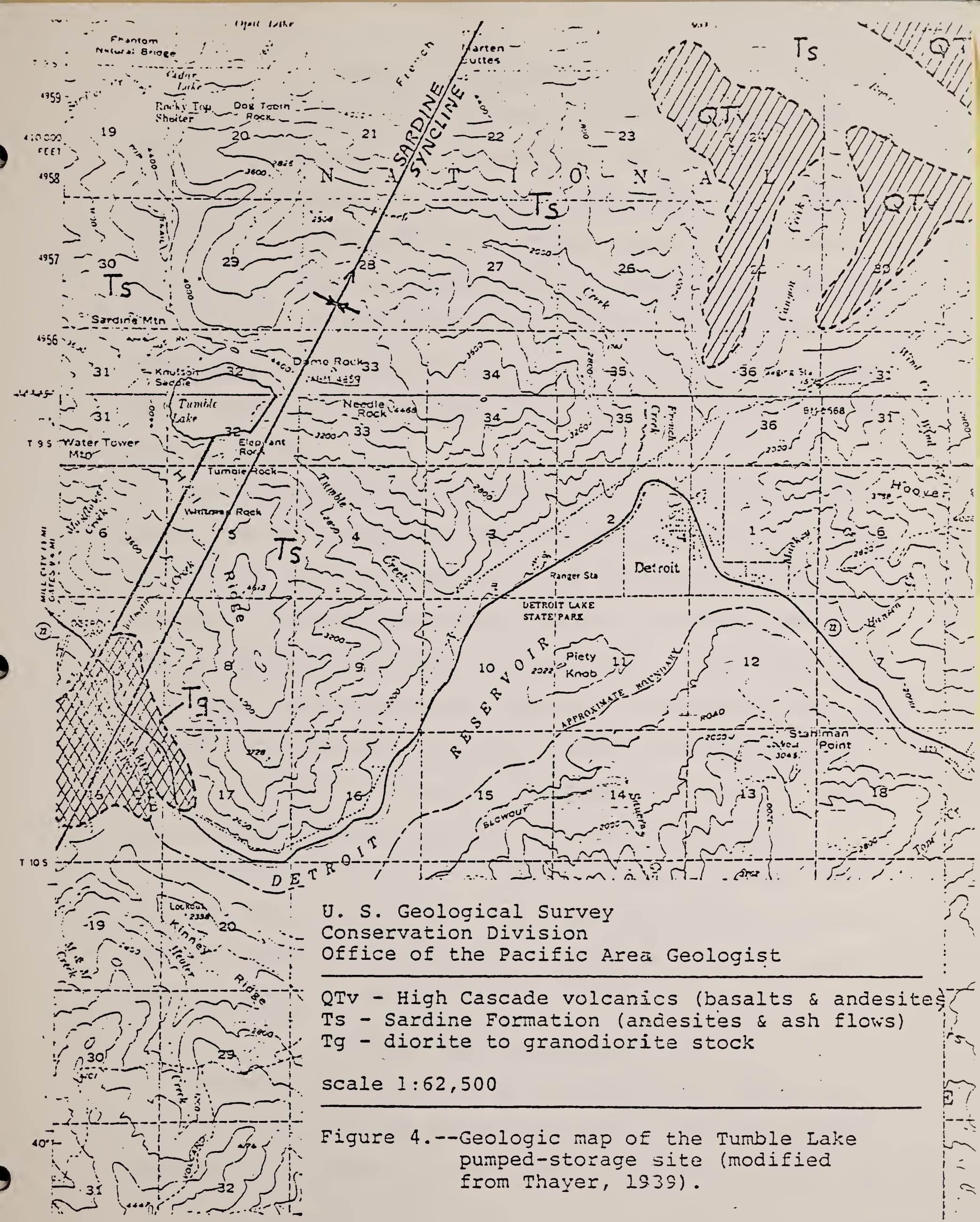
Figure 3.--Area and Capacity of Tumble Lake and Detroit Reservoir

GEOLOGY

General Geology of the Site

Peck and others (1964) have done reconnaissance mapping of the area. They reported pyroxene andesites, ash flows, tuff breccias, and lapilli tuffs of the Sardine Formation in the area of the upper pool. The type locality of the Sardine Formation is Sardine Mountain, which forms the northwest wall of the Tumble Lake valley. The type locality was described by Thayer (1936, 1939). Sardine Mountain, Dome Rock, and in all likelihood, Elephant Rock, are all volcanic plugs and are sources for the Sardine Formation. According to Peck and others (1964), the Sardine Formation is Miocene in age, but Thayer (1936,1939) assigned a range in age from Oligocene to middle or upper Miocene. See figure 1, a geologic map from Thayer (1939) as modified by fieldwork for this report.

The regional structure of the area of the upper pool and penstock route is dominated by the asymmetric Sardine syncline. Steep dips on the east flank and shallow dips on the west flank characterize this fold structure, which is a part of a series of asymmetrical anticlines and syclines found in the western Cascades. According to Thayer (1936), the axis of the Sardine syncline plunges northward about 10 degrees, but this plunge angle is not observable in the vicinity of Tumble Lake. The source vents around Tumble Lake (Sardine Mountain, Dome Rock, and Elephant Rock), the Halls granodiorite intrusion, and several other sources of the Sardine Formation are located on or very near the axis of the Sardine syncline, which represents a zone of weakness. Peak and others (1964, p. 50) pointed out that "...the distribution of the vents in belts suggests that the vents are along deep fracture zones that channeled ascending magmas."



U. S. Geological Survey
Conservation Division
Office of the Pacific Area Geologist

QTv - High Cascade volcanics (basalts & andesites)
Ts - Sardine Formation (andesites & ash flows)
Tg - diorite to granodiorite stock

scale 1:62,500

Figure 4.--Geologic map of the Tumble Lake pumped-storage site (modified from Thayer, 1939).

Geology of Upper Pool Damsite

The right abutment will be founded at the base of Elephant Rock, which is a possible vent for the andesites of the Sardine Formation. The rock at the abutment is a dark-gray to dark-greenish-gray, moderately altered, fine-grained andesite with pyroxene phenocrysts. At the base of Elephant Rock, there is a considerable pile of talus with much vegetation and overgrowth. Weathering of the rock indicates a somewhat platy fracture pattern, but for the most part, the fractures are tight and not through-going. Because of the vent source, dips on flow structures in the andesites are chaotic.

The left abutment will be founded in the talus accumulations at the base of Dome Rock, another vent source for the Sardine Formation. The rock here, as in the right abutment, is altered andesite with tight fracturing. The alteration of these andesites is reported to be of the nature of propylitization (Peck and others, 1964). Propylitization is a hydrothermal process that changes pyroxene and olivine phenocrysts in the andesites to an assemblage of minerals including carbonates, epidote, quartz, and chlorite. In the case of the andesites around Tumble Lake, the phenocrysts have been chloritized, hence the greenish color.

The floor of the dam axis is completely covered with heavy forest vegetation with no outcrops to be seen. The andesites found in both abutments are continuous across the floor. The amount of cover is undeterminable without trenching or drilling.

Geology of Upper Pool Reservoir

The upper pool will be formed by the enlargement of Tumble Lake by a 195-foot (59.4 m) high dam across Tumble Creek. Tumble Lake occupies a depression in the floor of a glacial cirque of late Wisconsin age (Figure 2).

Figure 5.--Tumble Lake cirque from Halls Ridge road
(view SE, Tumble Lake in middle ground)

Although no evidence of glaciation was found during the brief reconnaissance for this report, an examination of the physiography of the location indicates that this favorable pumped-storage site exists due to the presence of a well-formed cirque. Also, Thayer (1939) indicated that in his opinion, Tumble Lake lies in a glacial cirque. The lake is drained to the southeast by Tumble Creek which runs into the Detroit Reservoir.

The floor of the cirque is covered by a cover of soil and humus which is probably quite thick. Vegetation is very heavy, with a lot of deadfall and heavy underbrush. Traversing the cirque on foot is very difficult; however, there is a trail from the ridgecrest between Dome Rock and Sardine Mountain to the lake that makes access to the lake easier. There are a few outcrops and large boulders spotted about the floor, and they are altered, grayish-green andesites. One large boulder near the lake is of a lithic rich ash-flow tuff that probably came from Tumble Rock. Although the Sardine Syncline axis goes through or very near the area of the upper pool, dips on the rocks around the cirque are nearly horizontal.

Geology of the Penstock Area

A traverse down the northwest side of Whitman Creek from Whitman Rock to the reservoir was made to observe the type of rock that would be encountered in the underground emplacement of the penstock. The rocks are almost entirely andesite flows of varying degrees of alteration and induration. Alteration processes tend not to affect the hardness of the rocks. The andesite flows form steep to vertical cliffs (Figure 3) and

have little or no fracturing. There may be a few interbeds of softer tuffaceous material between flows, but evidence for their occurrence was not readily observable. A few of the andesite flows have vugs or cavities filled with crystalline and amorphous quartz.

The lower end of the penstock near the Detroit Dam will lie in or very near a stock of granodiorite (Hall's diorite of Thayer, 1939). This medium-grained intrusive has penetrated the Sardine Formation lava flows with very little disturbance (Pungrassami, 1970). According to Thayer (1939), this lack of disturbance in the surrounding flows suggests that the granodiorite was intruded quietly. Peck and others (1964) and Jaffe (1959) report that the intrusive has been radiometrically dated as 23-25± 10 million years old. Pyrite is a common alteration mineral associated with the granodiorite (Pungrassami, 1970).

CONSTRUCTION MATERIALS AND METHODS

Crushed rock for a dam fill can be obtained from quarries that could be opened along the upper Halls Ridge road above Tumble Lake. Rocks from that location are andesite flows and are quite suitable for dam fill and facing material. Impervious dam fill can be obtained from the soil cover within the Tumble Lake cirque. Material removed from the mining of the penstock might be the best fill material to use in the dam construction. Utilizing this material would preclude construction of environmentally objectionable quarries. Access to the Tumble Lake upper pool is up the French Creek road to the Halls Ridge road. There a new road would have to be built down the inner wall of the cirque to the lake. This would be a major task as the slopes are quite steep. Material for road metal can be easily obtained along the Halls Ridge road.

Excavation of the dam axis and abutments can be done by conventional methods. Talus piles at the abutments will have to be removed and quite possibly this talus can be used in the dam construction. Bedrock shaping would probably be at a minimum due to the grinding, smoothing glacial action at the time of cirque formation.

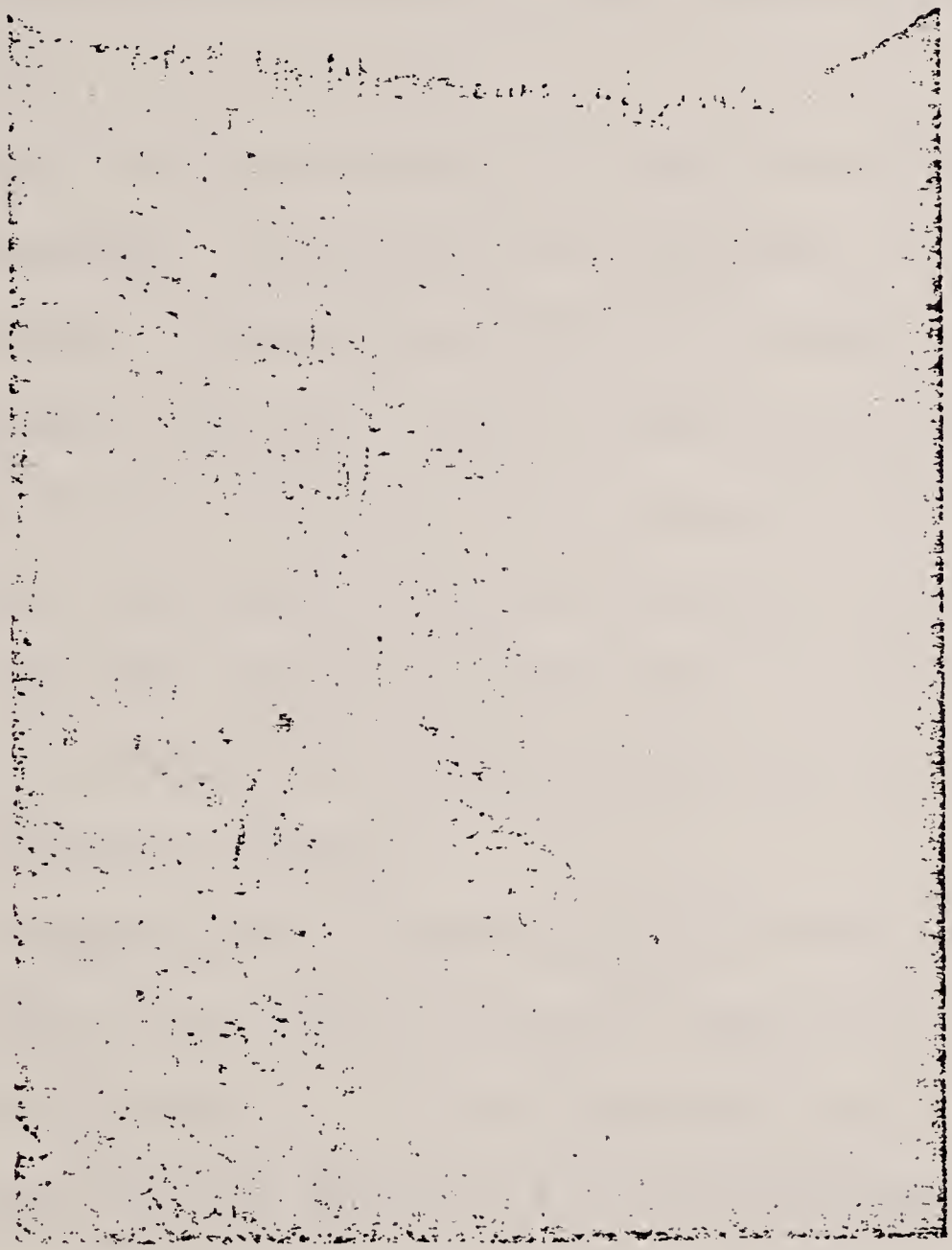


Figure 6.--Penstock route along Whitman Creek

CONCLUSIONS AND RECOMMENDATIONS

As indicated in the Introduction, pumped storage offers the most promising future for peak electrical power needs in the Pacific Northwest. In this region the peak demand pattern in a day differs depending upon the time of the year. In summer and spring it occurs during late morning hours before noon or immediately thereafter, and in the winter months it takes place in the evening (BPA 1970). The site in this study could operate on this pattern to ease the maximum daily demand on a weekly cycle.

The Tumble Lake pumped-storage site seems to be geologically suitable for development. No serious fracturing occurs in the upper pool and penstock areas. Construction materials are readily available. The site is reasonably accessible. Loss of water from the upper pool by seepage would be at a minimum due to the strong character of the andesite flows. Mining of the penstock would be in structurally sound, indurated flow rock. Any minor interbeds would be thin and could be grouted and sealed off. The granodiorite intrusive contact with the andesite flows represents no special problems.

It is recommended that a trenching and/or drilling program be carried out in the floor of the cirque to determine depth of soil cover and character of the bedrock. It is also recommended that a drilling program be carried out to explore the mining area for the penstock to determine the precise character of the rocks. Physical property determinations of the damsite and construction materials should be made to determine suitability of use. A more thorough geologic mapping program should be made to pinpoint specific problem areas and outline source areas for construction materials.

The site is topographically and hydrologically sound for pumped-storage development. Other favorable factors are: only one dam and reservoir is needed as the existing Detroit Reservoir would be utilized as the lower reservoir and source of water; (2) the environmental impact would be low because the lake is located in a relatively remote area and only one underground penstock would be required; (3) all the lands affected by the site development are in federal ownership; and (4) the powerplant would be located relatively close to the load center.

The number of sites that could satisfy all the requirements for pumped-storage development are limited in nature. Therefore, the 840 acres (339.9 ha) of lands which would be affected by the Tumble Lake site development should be classified to protect their water resource value for the future.

LANDS AFFECTED

The lands listed below would be affected by development of the pumped-storage site and have a value for power site purposes. Classification of these lands is recommended.

Federal Lands Within Tumble Lake Site
Willamette Meridian, Oregon
Willamette National Forest

	Acres
T. 9 S., R. 5 E.	
sec. 31, SE¼NE¼ and NE¼SE¼;	80
sec. 32, SW¼NE¼, S½NW¼, SW¼, and W½SE¼;	360
T. 10 S., R. 5 E.	
sec. 5, W½NW¼;	80
sec. 6, E½NE¼, N½SE¼, and SW¼SE¼;	200
sec. 7, NW¼NE¼ and E½NW¼.	120
Total	840 acres (339.9 ha)

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Bateman 6-
Albert 6-24-
Bureau 6/30/

Minutes of the Mineral Land Classification Committee

Date: June 3, 1977

Subject: Coal classification of lands in the Alton-Kanab coal field, Kane County, Utah

Minutes prepared by: Allen A. Aigen

In consultation: William E. Bowers and Elizabeth G. Allen

INTRODUCTION

Lands in the following townships, previously either withdrawn pending classification or classified as noncoal, are considered herein for classification as coal lands.

Salt Lake Meridian

T. 37 S., Rs. 3 and 4 W.
T. 38 S., Rs. 3, 4, 5, and 6 W.
T. 39 S., Rs. 4, 4½, 5, and 6 W.
T. 40 S., Rs. 4, 4½, 5, and 7 W.

Basis for Committee Action

Several actions were taken with regard to the land status in these townships between December 11, 1908, and February 26, 1963, and are described for each township.

Standards for coal classification are derived from standards for the Classification of Public Coal Lands (Geological Survey Circular 633). The coal in each township herein exceeds the minimum thickness and depth requirements specified in Circular 633.

Committee action is based on the following reports and studies:

U.S. Geological Survey Coal Investigations Map C-49, 1961, by W. R. Cashion; U.S. Geological Survey Miscellaneous Geologic Investigations Map I-494, 1967, by W. B. Cashion; Utah Geological and Mineralogical Survey Monograph Series No. 1, 1972, by H. H. Doelling and R. L. Graham; U.S. Geological Survey Miscellaneous Field Studies Maps MF-520, MF-521, 1973, by H. D. Goode; U.S. Geological Survey Professional Paper 226, 1951, by H. E. Gregory; unpublished, and in progress, reports and proprietary information for coal drill holes from the offices of the Area Geologist and the Area Mining Supervisor.

Illustrations, included as part of these minutes, consist of plats of the above-listed townships classified and reclassified as coal lands, and a map of the known recoverable coal resource area for the Alton-Kanab coal field showing the geologic formations and outline of the lands classified as coal lands.

The Alton-Kanab coal field is in west-central Kane County in southwestern Utah. The coal-bearing Dakota Formation crops out in a roughly horseshoe-shaped area around the south end of the Paunsaugunt Plateau, forming one of a succession of south-facing cliffs.

The Lower(?) and Upper Cretaceous Dakota Formation lies unconformably on Jurassic formations, and is overlain by a thick marine unit, the Tropic Shale. The Dakota Formation is about 250 feet of mudstones and sandstones with major coal zones at the top (Smirl Zone) and near the base (Bald Knoll Zone). The Smirl Zone varies from 3 to 20 feet thick and is the basis for most of the classification. The Bald Knoll Zone is generally less than 30 inches thick without significant partings and is important in a small area of the northwestern portion of the field and in the northeastern portion of the field where it predominates.

Most of the area lies between two major regional faults, the Sevier Fault on the west, and the Paunsaugunt Fault on the east, with a small area near Cannonville in the northeastern part of the field, east of the Paunsaugunt Fault. Minor faults are common throughout the field. Dips are gentle, generally northward.

The known recoverable coal resource area was delineated on the basis of identified resources as defined in the Joint Geological Survey-Bureau of Mines Resource Classification Agreement of November 21, 1973. Overburden is generally less than 3,000 feet. The coal is of an apparent subbituminous B rank, with an average Btu value of approximately 9,500 as received.

T. 37 S., R. 3 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910. The township was partially classified noncoal July 12, 1915, and January 25, 1924, and included in Coal Land Restoration Utah Nos. 30 and 44, approved July 31, 1915, and March 8, 1924, respectively.

U.S. Geological Survey drill holes in the area to be classified demonstrate the presence of coal beds in the Dakota Formation greater than 30 inches thick.

The following described lands embracing 2,293 acres are classified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 37 S., R. 3 W.,
sec. 29, W½E½, W½;
secs. 30 and 31;
sec. 32, W½NE¼, W½, SE¼.

T. 37 S., R. 4 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910.

U.S. Geological Survey drill holes in the area to be classified demonstrate the presence of coal beds in the Dakota Formation greater than 30 inches thick.

The following described lands embracing 3,598 acres are classified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 37 S., R. 4 W.,
secs. 25 and 26;
sec. 27, E½;
sec. 33, E½SE¼;
secs. 34 to 36, inclusive;
HES. 118 and 119.

T. 38 S., R. 3 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910. The township was partially classified noncoal, approved July 23, 1915, and January 25, 1924, and included in Coal Land Restoration Utah Nos. 31 and 44, approved August 25, 1915, and March 8, 1924, respectively.

Coal beds in the Dakota Formation outcropping in this township are greater than 30 inches thick in the areas to be classified and reclassified.

The following described lands embracing 1,694 acres are classified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 38 S., R. 3 W.,
sec. 5, lots 2 to 4, inclusive, SW¼NE¼, W½NW¼, N½SW¼, SW¼SW¼, NW¼SE¼;
sec. 6;
sec. 7, lots 1 to 3, inclusive, N½NE¼, SW¼NE¼, E½W½, SE¼;
sec. 8, NW¼NW¼, W½SW¼.

Prior classification of the following described lands embracing 240 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 38 S., R. 3 W.,
sec. 5, SE¼SW¼;
sec. 7, SE¼NE¼;
sec. 8, E½NW¼, SW¼NW¼, NE¼SW¼.

T. 38 S., R. 4 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910.

Coal beds in the Dakota Formation outcropping in this township are greater than 30 inches thick in the areas to be classified.

The following described lands embracing 10,449 acres are classified as coal land on the basis of the data cited above:

Salt Lake Meridian

T. 38 S., R. 4 W.,
secs. 1 to 3, inclusive;
sec. 4, E½;
sec. 9, E½, E½W½;
secs. 10 and 11;
sec. 12, N½, N½S½;
sec. 13, SW¼, S½SE¼;
sec. 14, W½NE¼, W½, SE¼;
secs. 15 and 16;
secs. 22, E½, E½W½;
sec. 23;
sec. 24, N½, SW¼, NW¼SE¼;
sec. 26, W½E½, W½;
sec. 27, E½, E½W½;
sec. 33, SE¼;
sec. 34, NE¼, E½NW¼, S½;
sec. 35, W½E½, W½, SE¼SE¼;
HES. 118 and 119.

T. 38 S., R. 5 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910. The township was classified coal November 28, 1910, and noncoal July 27, 1910, and included in Coal Land Restoration Utah No. 1, approved September 28, 1910.

Prior classification of the following described lands embracing 3,640 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 38 S., R. 5 W.,
sec. 19, SE¼SE¼;
sec. 20;
sec. 21, NW¼, S½;
sec. 27, W½, W½SE¼;
sec. 28;
sec. 29, N½NE¼, SE¼NE¼;
sec. 30, lots 3 and 4, NW¼NE¼, SE¼NW¼, NE¼SW¼;
sec. 33, NE¼, E½NW¼, E½SE¼;
sec. 34;
sec. 35, SW¼.

T. 38 S., R. 6 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910. The township was classified coal November 29, 1910, and noncoal July 27, 1910, and included in Coal Land Restoration Utah No. 1, approved September 28, 1910, and partially reclassified coal February 26, 1963. U.S. Geological Survey drill holes in an adjacent quadrangle to the area to be reclassified demonstrate the presence of coal beds in the Dakota Formation greater than 30 inches thick.

Prior classification of the following described lands embracing 320 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 38 S., R. 6 W.,
sec. 25, SE¼SE¼;
sec. 36, NE¼NE¼, W½NE¼, NE¼SW¼, S½SW¼, NW¼SE¼.

T. 39 S., R. 4 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910.

U.S. Geological Survey drill holes and outcropping of coal beds in the Dakota Formation in the area to be classified demonstrate the presence of coal greater than 30 inches thick.

The following described lands embracing 19,332 acres are classified as coal lands on the basis of the data cited above;

Salt Lake Meridian

T. 39 S., R. 4 W.,
secs. 1 and 2;
sec. 3, lots 1 and 2, S½E½;
sec. 8, E½;

T. 39 S., R. 4 W., continued,
secs. 9 to 23, inclusive;
sec. 24, N½NE¼, W½;
sec. 25, W½;
sec. 26, NE¼NE¼, W½E½, W½;
secs. 27 to 34, inclusive;
sec. 35, W½NE¼, W½, NW¼SE¼.

T. 39 S., R. 4½ W. was withdrawn for coal by Coal Land Withdrawal Utah No. 14, approved November 17, 1926.

U.S. Geological Survey drill-hole data in the area to be classified demonstrates the presence of coal greater than 30 inches thick in the Dakota Formation.

The following described lands embracing 6,197 acres are classified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 39 S., R. 4½ W.,
sec. 13, SE¼SW¼, SE¼;
sec. 14, S½SW¼;
sec. 15, lot 4, SE¼SW¼, S½SE¼;
secs. 22 to 27, inclusive;
secs. 34 to 36, inclusive.

T. 39 S., R. 5 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910. It was partially classified coal December 11, 1908, September 29, 1910, October 7, 1910, and February 26, 1963, and noncoal October 7, 1910, and included in Coal Land Restoration Utah No. 2, approved October 12, 1910.

U.S. Geological Survey drill holes and outcropping of coal beds in the area to be classified and reclassified demonstrate the presence of coal greater than 30 inches thick.

The following described lands embracing 1,080 acres are classified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 39 S., R. 5 W.,
sec. 3, SE¼NE¼, NE¼SE¼, S½SE¼;
sec. 10, E½NE¼;
sec. 14, S½NW¼, SW¼;
sec. 23, NE¼, NE¼NW¼, N½SE¼;
sec. 24, N½.

Prior classification of the following described lands embracing 2,494 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 39 S., R. 5 W.,
sec. 1, W½SW¼;
sec. 2;
sec. 11;
sec. 12, W½;
sec. 13, W½E½, W½;
sec. 14, E½.

T. 39 S., R. 6 W. was withdrawn for coal, approved February 24, 1908. The township was classified as coal land and noncoal land in December 11, 1908, August 27, 1910, and February 26, 1963.

Coal outcrops in this township demonstrate the presence of greater than 30 inches of coal in the Dakota Formation in the area to be reclassified.

Prior classification of the following described lands embracing 120 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 39 S., R. 6 W.,
sec. 25, SW¼SW¼;
sec. 26, SE¼SE¼;
sec. 35, NE¼NE¼.

T. 40 S., R. 4 W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910. It was partially classified as noncoal January 25, 1924.

Proprietary drill holes and outcropping of coal beds in the Dakota Formation in the area to be classified and reclassified demonstrate the presence of coal greater than 30 inches thick.

The following described lands embracing 4,413 acres are classified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 40 S., R. 4 W.,
sec. 4, lots 1 to 4, inclusive, S½N½, SW¼, NW¼SE¼;
secs. 5 and 6;
sec. 7, lots 1 to 19, inclusive, NE¼, N½SE¼;
sec. 8, N½, NW¼SW¼, SE¼;
sec. 9, W½NW¼, NW¼SW¼;
sec. 18, lots 1 to 13, inclusive, and lot 16;
sec. 19, lot 5.

Prior classification of the following described lands embracing 600 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 40 S., R. 4 W.,
sec. 2, lots 2 to 4, inclusive, SW¼NE¼, S½NW¼, NE¼SW¼, NW¼SE¼;
sec. 3, lots 1 to 4, inclusive, SE¼NE¼, SW¼NW¼.

T. 40 S., R. 4½ W. was withdrawn for coal by Coal Land Withdrawal Utah No. 1, approved July 7, 1910.

Bureau of Reclamation drill holes and outcropping of coal beds in the Dakota Formation in the area to be classified demonstrate the presence of coal greater than 30 inches.

The following described lands embracing 5,949 acres are classified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 40 S., R. 4½ W.,
secs. 4 to 9, inclusive;
sec. 16, NE¼, E½NW¼, NE¼SW¼, SE¼;
sec. 17, N½, SW¼, NW¼SE¼;
sec. 18;
sec. 19, lots 1 and 2, W½NE¼, E½NW¼;
sec. 20, NW¼, N½SW¼;
sec. 21, NE¼NE¼.

T. 40 S., R. 5 W. was withdrawn for coal in Coal Land Withdrawal Utah No. 1, approved July 7, 1910. It was classified coal November 29, 1910, and noncoal July 27, 1910, included in Coal Land Restoration Utah No. 1, approved September 28, 1910, and reclassified coal and noncoal February 26, 1963.

Proprietary drill holes and outcroppings of coal beds in the Dakota Formation in the area to be reclassified demonstrate the presence of coal greater than 30 inches thick.

Prior classification of the following described lands embracing 400 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 40 S., R. 5 W.,
sec. 27, W½SW¼;
sec. 28, W½NW¼, S½SE¼;
sec. 29, NW¼SE¼;
sec. 33, S½NE¼, SE¼NW¼.

T. 40 S., R. 7 W. was withdrawn for coal February 24, 1908, part of the township was listed in Coal Land Withdrawal Utah No. 1, approved July 7, 1910; the township was classified coal and noncoal land approved December 11, 1908, July 27, 1910, and February 26, 1963.

Outcroppings and abandoned mines adjacent to the land to be reclassified demonstrate the presence of coal greater than 30 inches thick.

Prior classification of the following described lands embracing 118 acres as noncoal is hereby revoked and the lands reclassified as coal lands on the basis of the data cited above:

Salt Lake Meridian

T. 40 S., R. 7 W.,
sec. 13, lot 12;
sec. 24, SW¼NE¼;
sec. 25, NW¼NW¼.

A total of 55,005 acres of land in nine townships is classified as coal land and a total of 7,932 acres in eight townships is reclassified from noncoal to coal, by this action.

Submitted and recommended by the Committee:

Geologist — Member

Geologist — Member

Area Geologist, Chairman

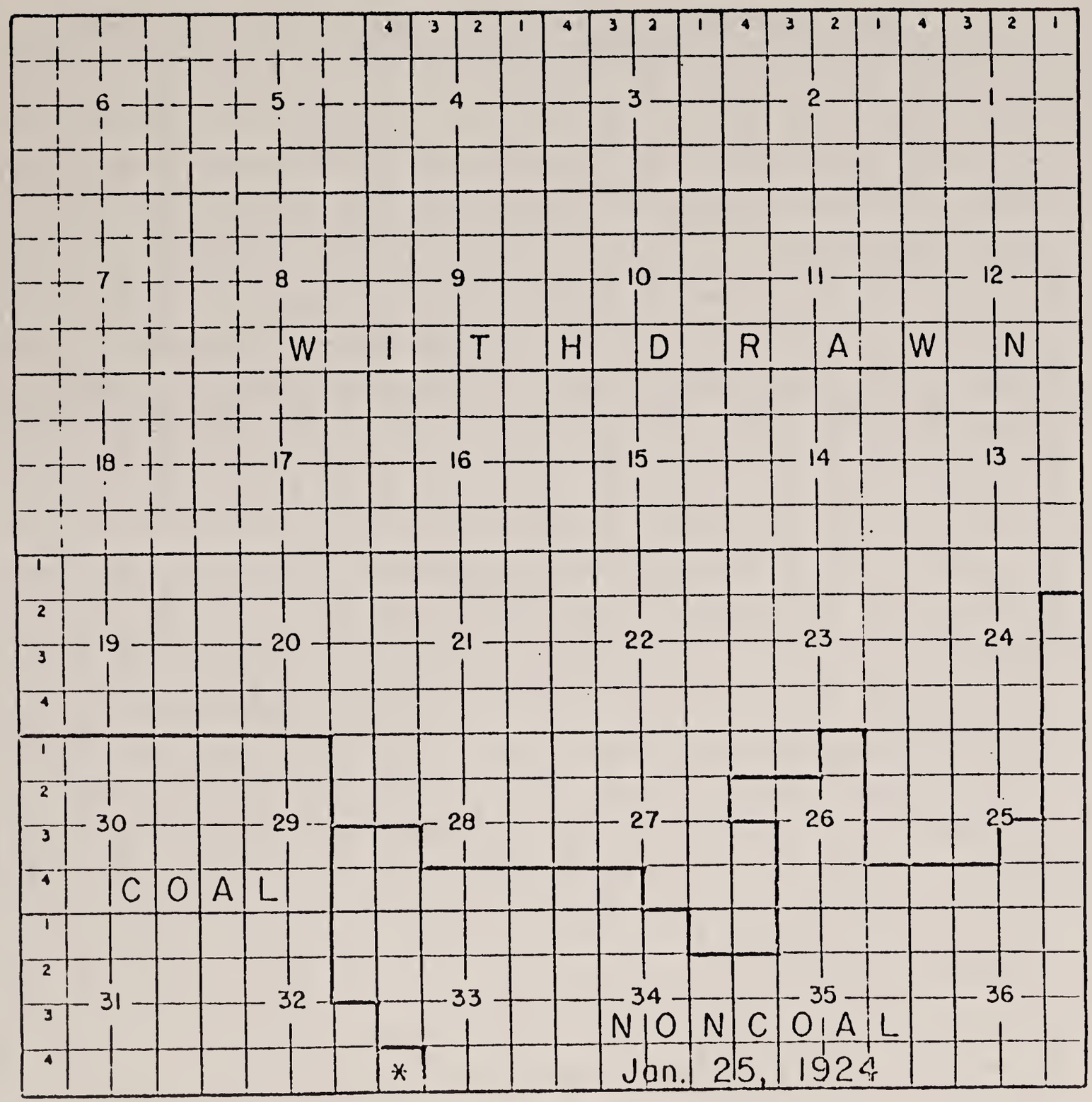
Reviewed by: _____ Date: June 16, 1977
Staff Geologist, Regional Manager's Office

Approved by: _____ Date: Jul 6, 1977
Acting Chief, Conservation Division

Enclosures: Classification Plats
Geologic Map

Copy to: District Geologist, Salt Lake City, UT
Area Geologist, CRMA, Denver, CO
~~Conservation Manager, Central Region, Denver, CO~~
Chief, Br. of Mineral & Water Classification, Denver, CO

TOWNSHIP 37 SOUTH, RANGE 3 WEST, SALT LAKE MERIDIAN, UTAH
(Partly unsurveyed)



* WITHDRAWN

COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	2,293	
Reclassified by this action		
Prior classification		3,680
Total acres classified to date	2,293	3,680

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	17,067
Restored without classification	
Total acres not classified	17,067

Total acres in township 23,040

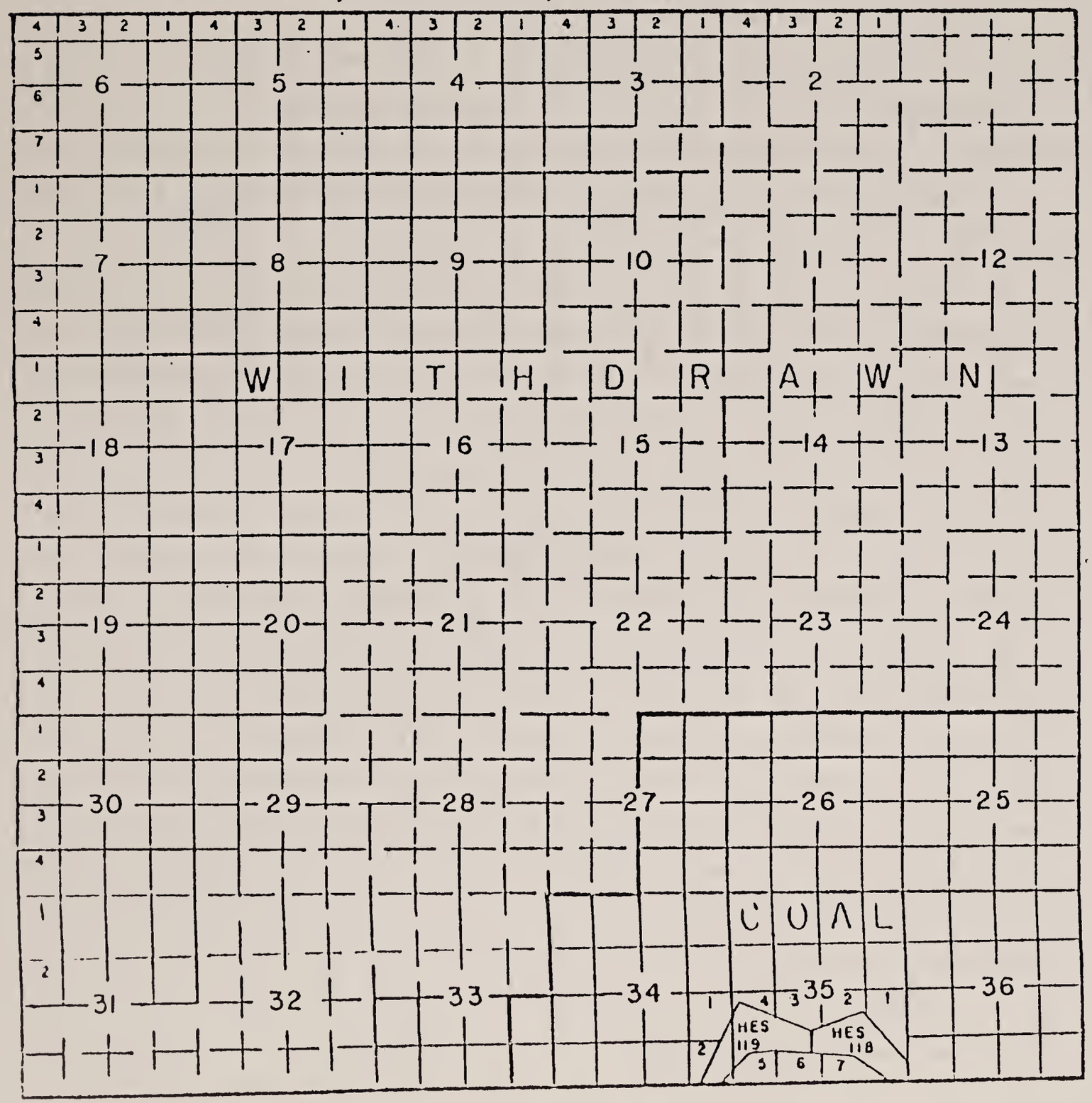
Classified on dates shown as:

- Mineral ☐
- Nonmineral ☐
- Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70, JUL 15, 1977.

Restored from ....., ..., by Public Land Order ....., published in Federal Register v. ....., p. ....., ...

TOWNSHIP 37 SOUTH, RANGE 4 WEST, SALT LAKE MERIDIAN, UTAH



COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	3,598	
Reclassified by this action		
Prior classification		
Total acres classified to date	3,598	

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	19,068
Restored without classification	
Total acres not classified	19,068

Total acres in township 22,666

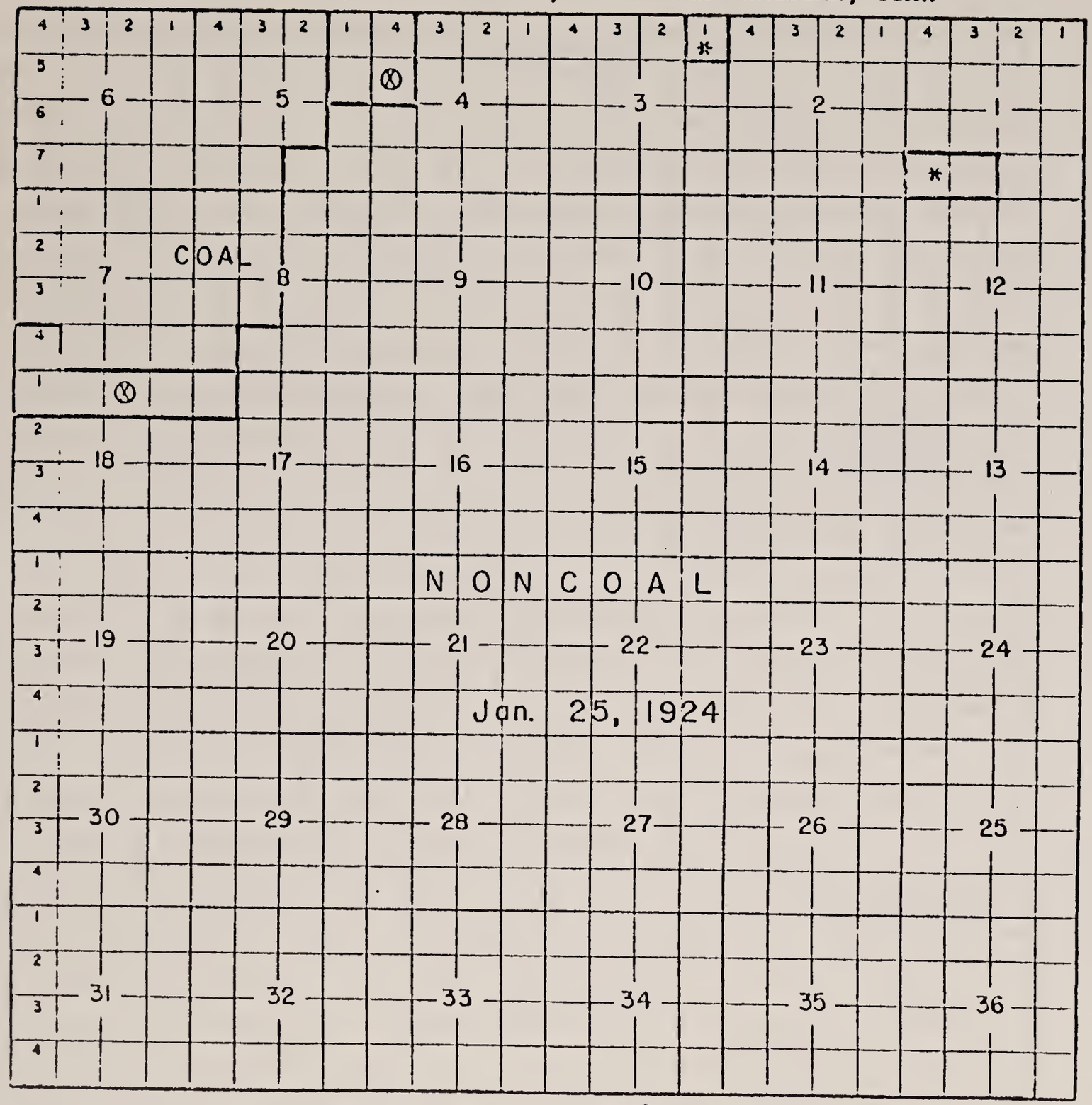
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977 published in Federal Register v. 42, p. 36569-70, JUL 15, 1977.

Restored from ....., ..., by Public Land Order ....., published in Federal Register v. ....., p. ....., ...

TOWNSHIP 38 SOUTH, RANGE 3 WEST, SALE LAKE MERIDIAN, UTAH



* NONCOAL - July 23, 1915

⊗ WITHDRAWN

COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	1,694	
Reclassified by this action	240	
Prior classification		20,748
Total acres classified to date	1,934	20,748

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	273
Restored without classification	
Total acres not classified	273

Total acres in township 22,955

Classified on dates shown as:

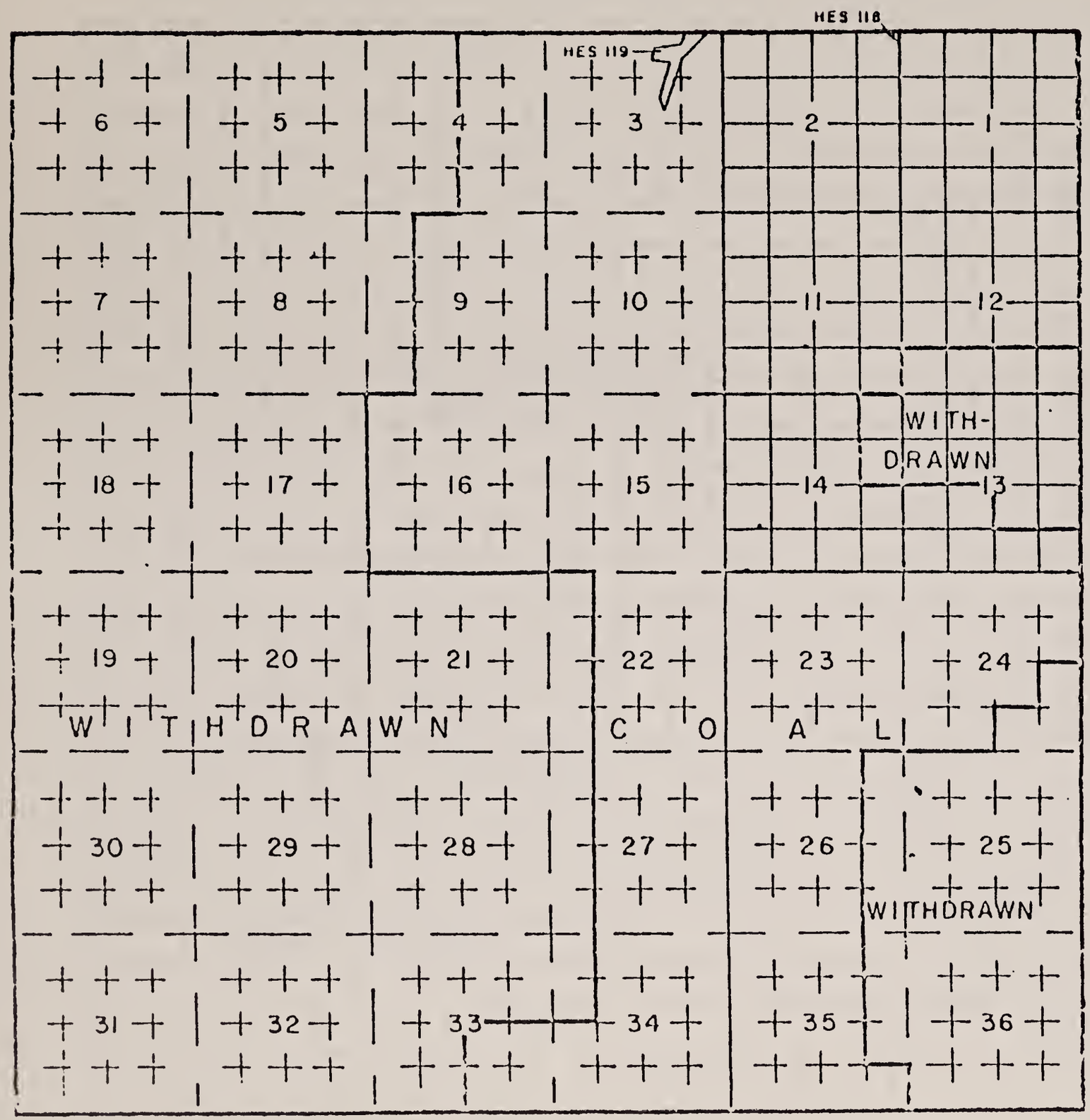
Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70, JUL 15, 1977.

Restored from ....., by Public Land Order ....., published in Federal Register v. ....., p. .....

TOWNSHIP 38 SOUTH, RANGE 4 WEST, SALT LAKE MERIDIAN, UTAH

(Partly surveyed)



COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	10,449	
Reclassified by this action		
Prior classification		
Total acres classified to date	10,449	

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	12,611
Restored without classification	
Total acres not classified	12,611

Total acres in township 23,060

Classified on dates shown as:

Mineral ☐

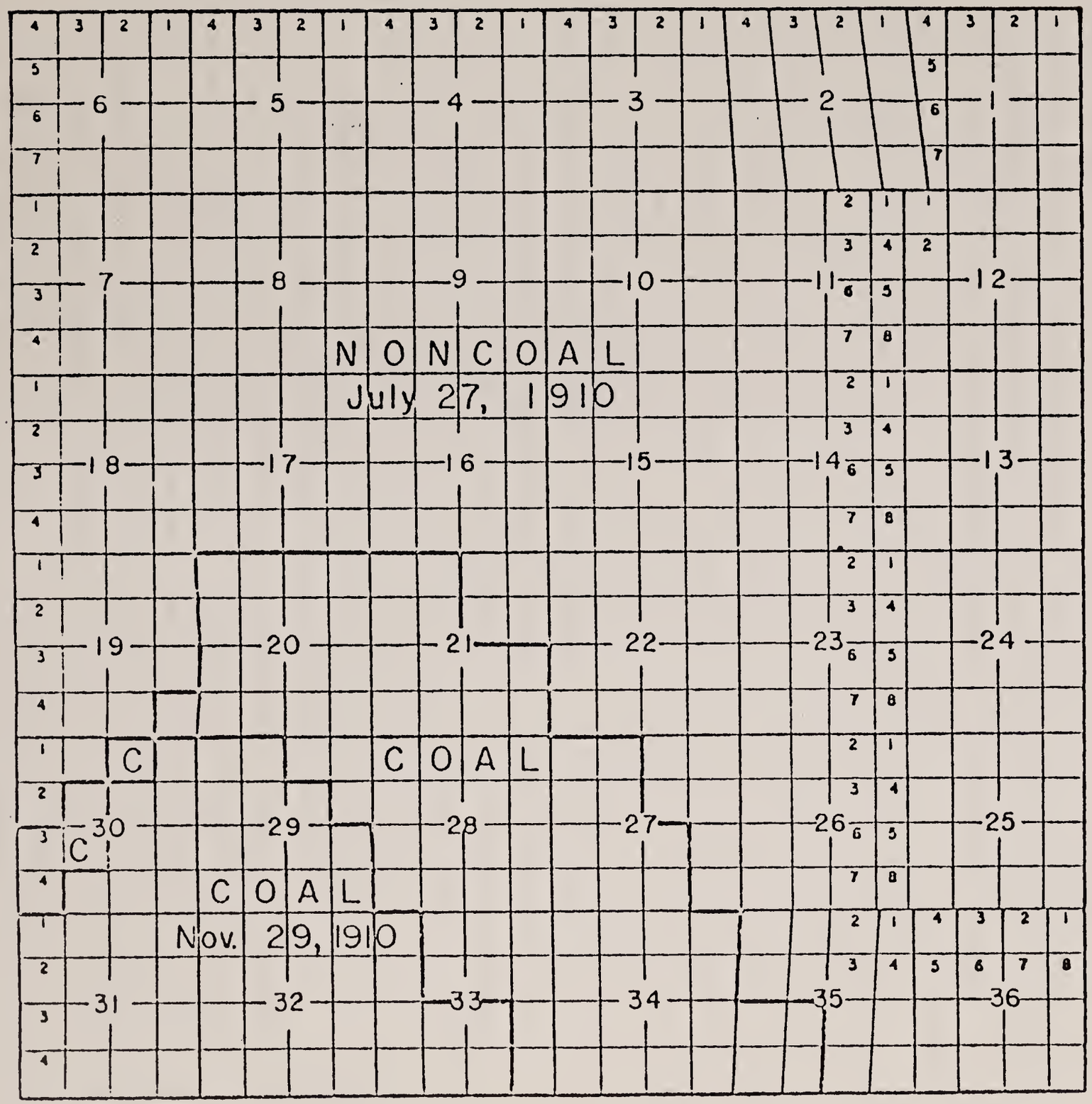
Nonmineral ☐

Not classified ☐

New classification approved by the Director, U.S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70, JUL 15, 1977.

Restored from , by Public Land Order , published in Federal Register v. , p. ,

TOWNSHIP 38 SOUTH, RANGE 5 WEST, SALT LAKE MERIDIAN, UTAH



COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action		
Reclassified by this action	3,640	
Prior classification	2,442	16,572
Total acres classified to date	6,082	16,572

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	
Restored without classification	
Total acres not classified	

Total acres in township 22,654

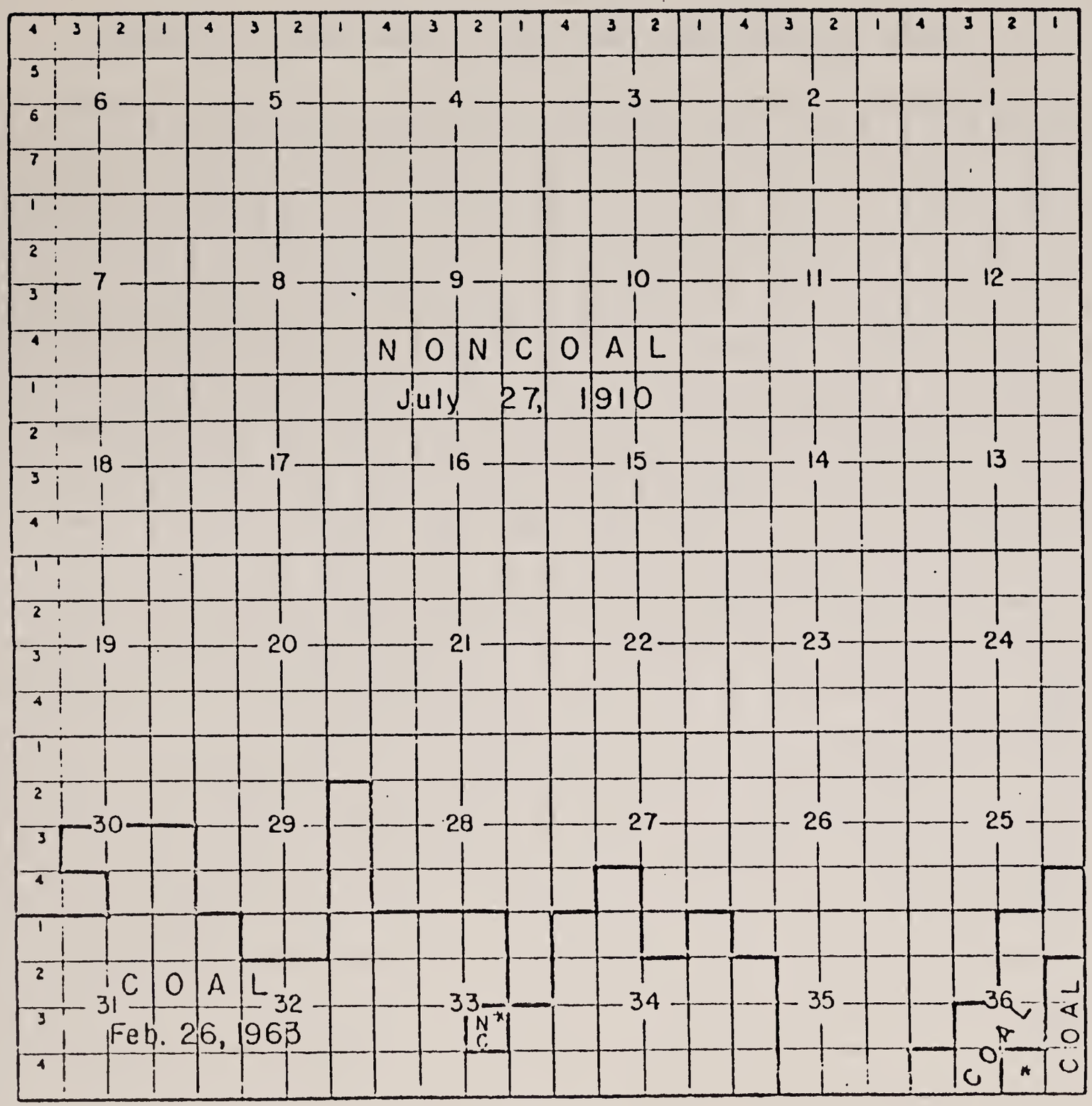
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70 JUL 15, 1977.

Restored from ....., ..., by Public Land Order ....., published in Federal Register v. ....., p. .....

TOWNSHIP 38 SOUTH, RANGE 6 WEST, SALT LAKE MERIDIAN, UTAH



* November 29, 1910

COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action		
Reclassified by this action	320	
Prior classification	2,954	19,752
Total acres classified to date	3,274	19,752

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	
Restored without classification	
Total acres not classified	

Total acres in township 23,026

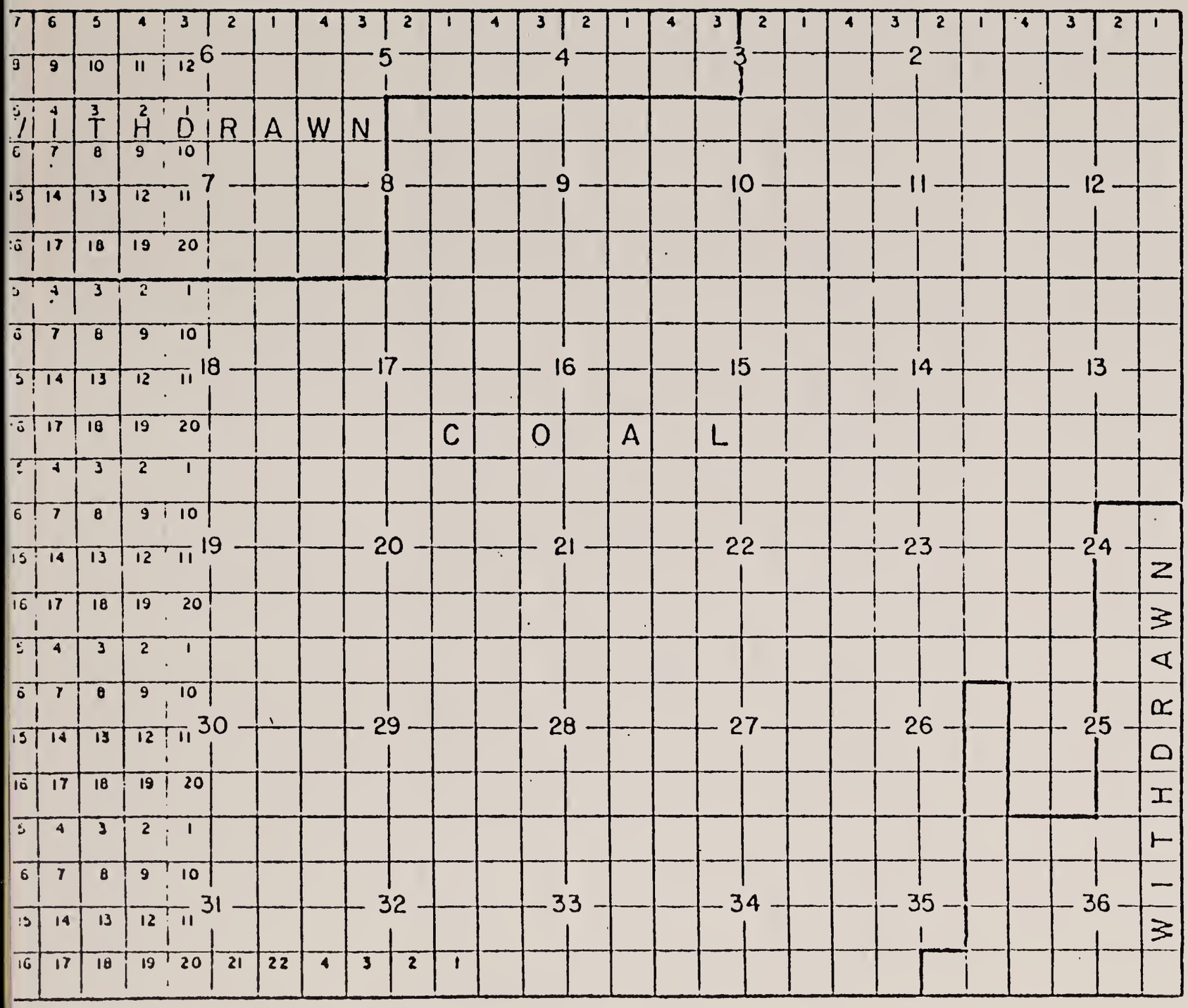
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U.S. Geological Survey, JUL 8, 1977 published in Federal Register v. 42, p. 36569-70 JUL 15, 1977.

Restored from ....., by Public Land Order ....., published in Federal Register v. ....., p. .....

TOWNSHIP 39 SOUTH, RANGE 4 WEST, SALT LAKE MERIDIAN, UTAH



COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	19,332	
Reclassified by this action		
Prior classification		
Total acres classified to date	19,332	

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	4,339
Restored without classification	
Total acres not classified	4,339

Total acres in township 23,671

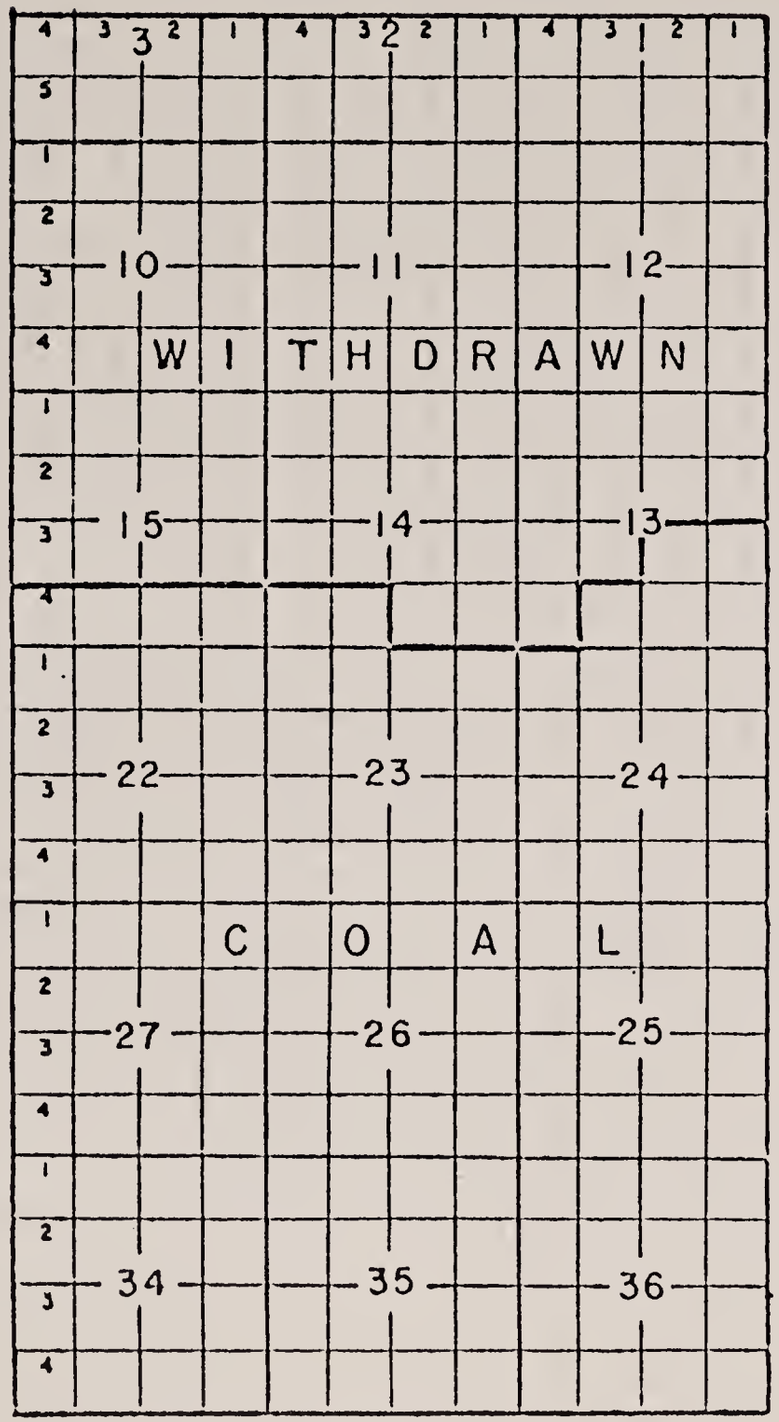
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U.S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70, JUL 15, 1977.

Restored from ....., by Public Land Order ....., published in Federal Register v. ..., p. ....., ...

TOWNSHIP 39 SOUTH, RANGE 4½ WEST, SALT LAKE MERIDIAN, UTAH



COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	6,197	
Reclassified by this action		
Prior classification		
Total acres classified to date	6,197	

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	4,439
Restored without classification	
Total acres not classified	4,439

Total acres in township 10,636

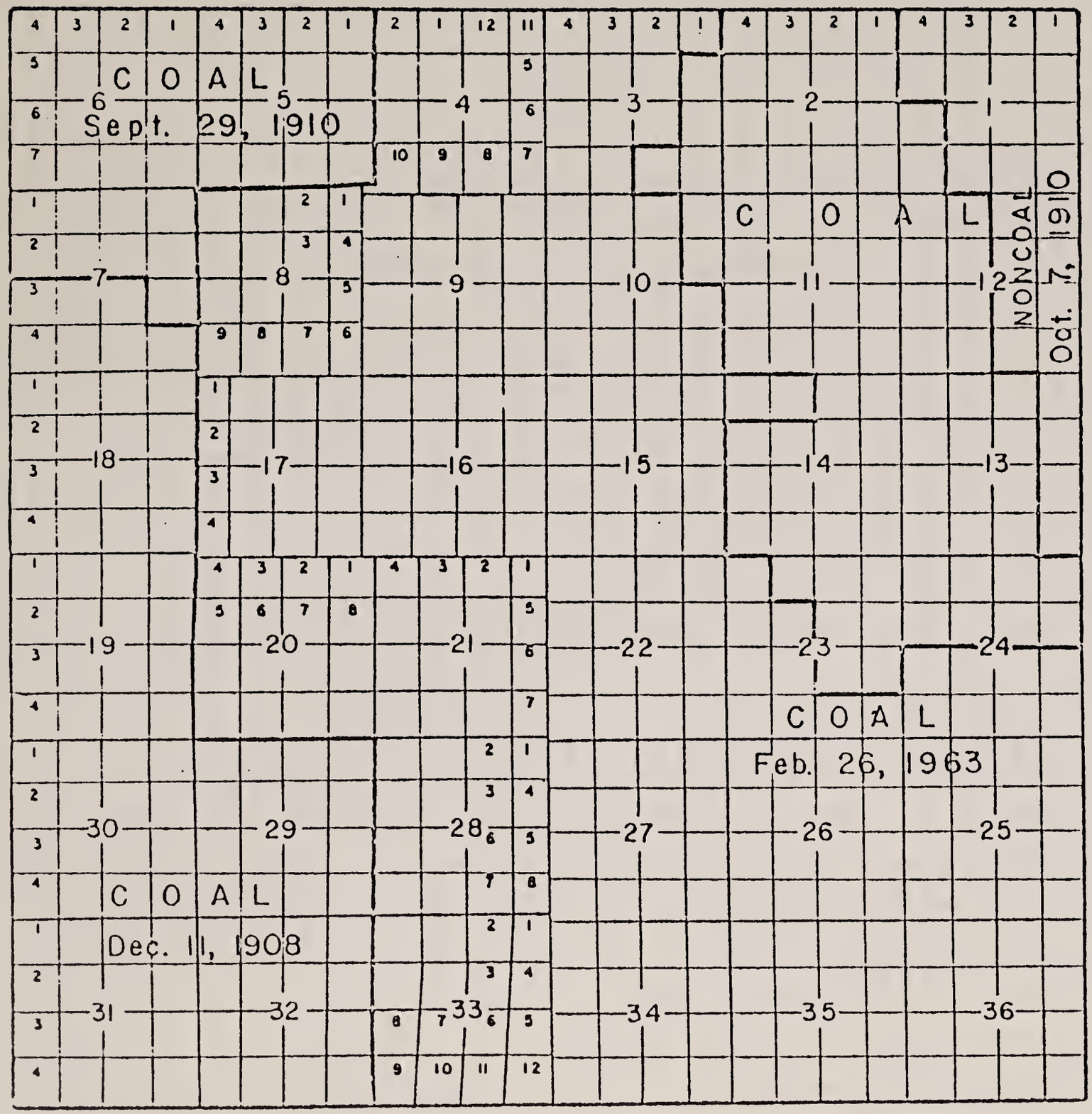
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U.S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70 JUL 15, 1977.

Restored from ....., ..., by Public Land Order ....., published in Federal Register v. ....., p. ....., ...

TOWNSHIP 39 SOUTH RANGE 5 WEST, SALT LAKE MERIDIAN, UTAH



COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	1,080	
Reclassified by this action	2,494	
Prior classification	18,247	1,049
Total acres classified to date	21,821	1,049

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	
Restored without classification	
Total acres not classified	

Total acres in township 22,870

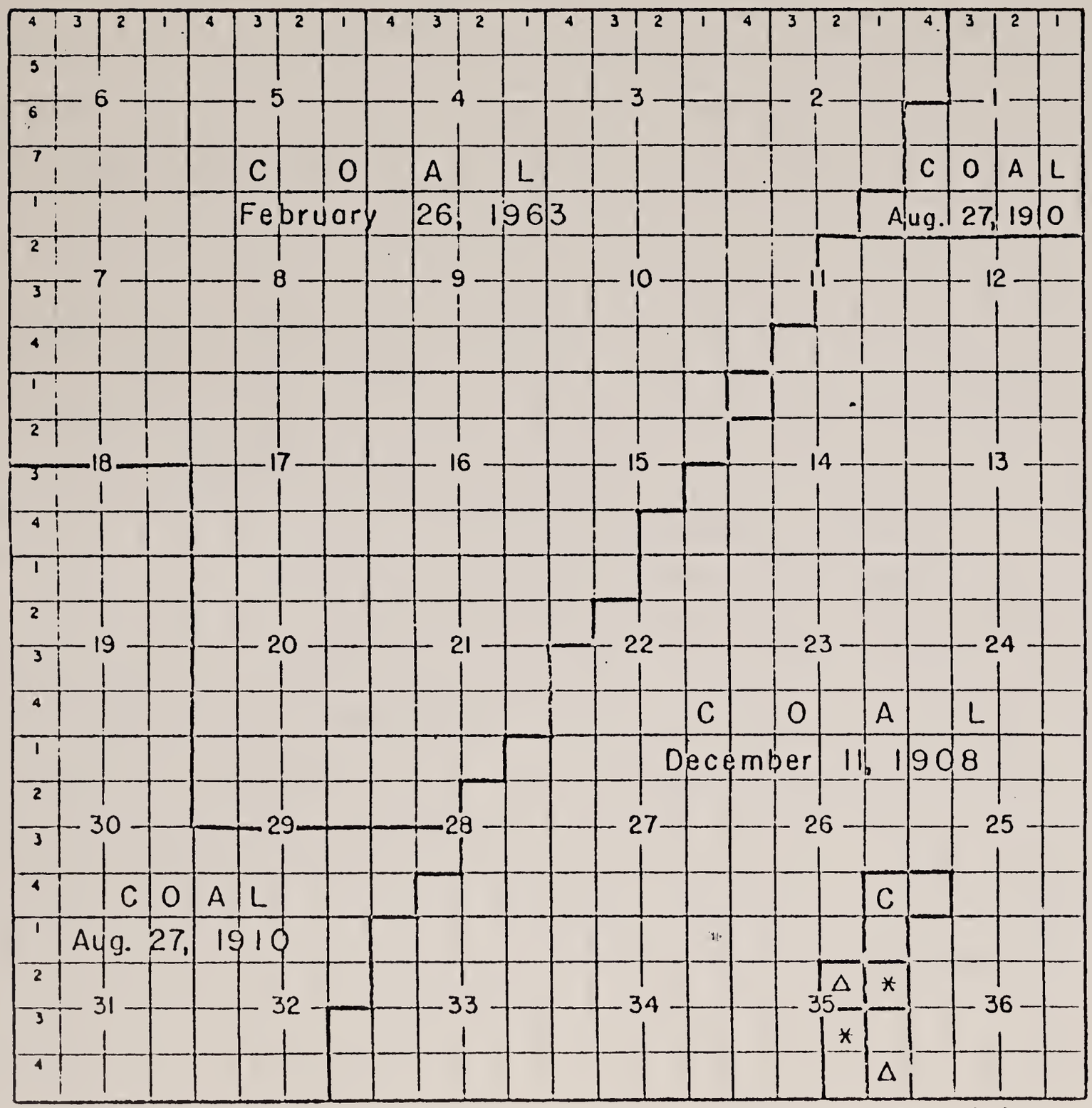
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U.S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70, JUL 15, 1977.

Restored from ....., by Public Land Order ....., published in Federal Register v. ....., p. .....

TOWNSHIP 39 SOUTH, RANGE 6 WEST, SALT LAKE MERIDIAN, UTAH



* NONCOAL - Dec. 11, 1908

△ COAL - Aug. 27, 1910

COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action		
Reclassified by this action	120	
Prior classification	22,845	120
Total acres classified to date	22,965	120

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	
Restored without classification	
Total acres not classified	

Total acres in township 23,085

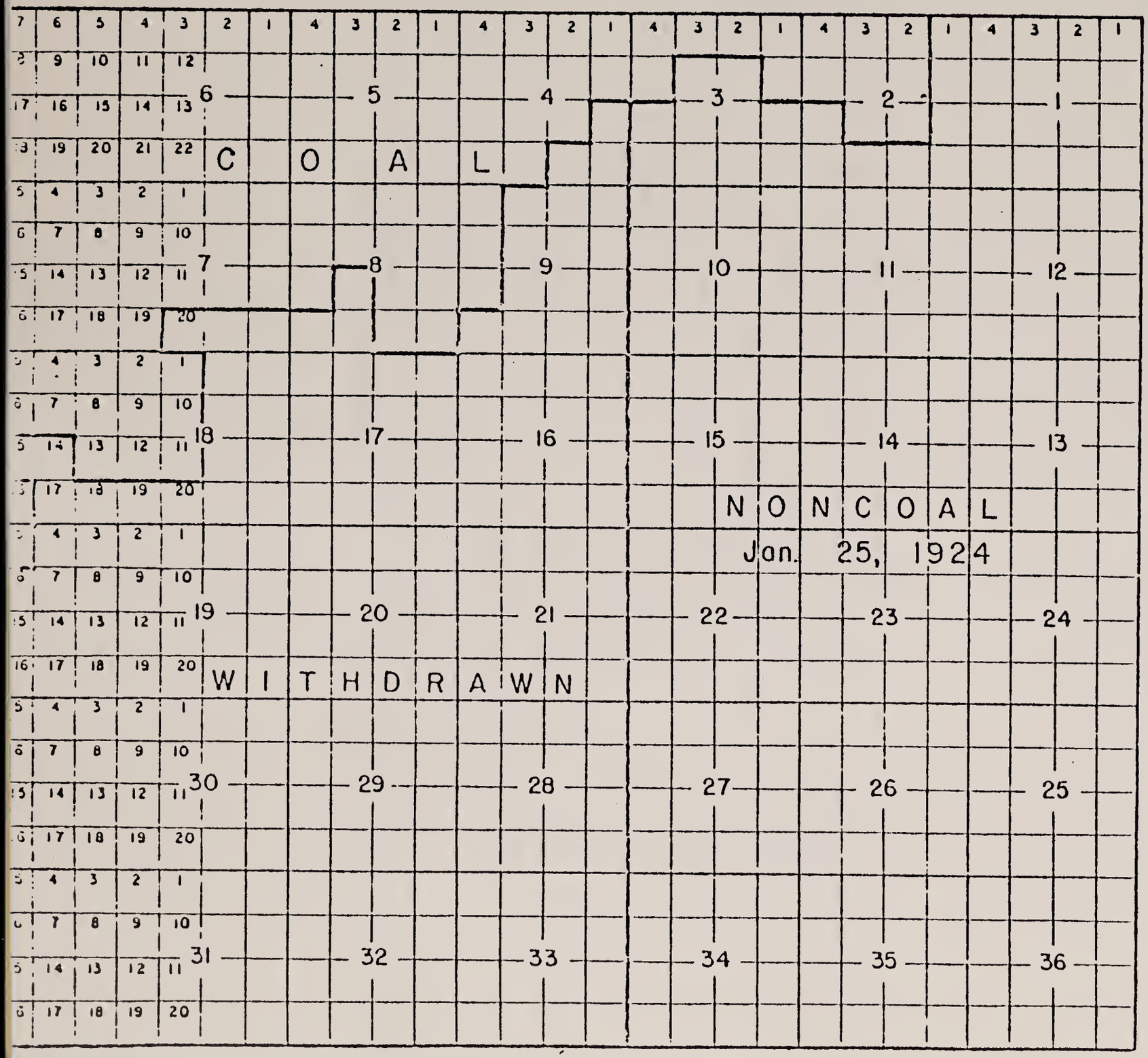
Classified on dates shown as:

- Mineral ☐
- Nonmineral ☐
- Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977 published in Federal Register v. 42, p. 36569-70 JUL 15, 1977

Restored from ....., by Public Land Order ....., published in Federal Register v. ....., p. .....

TOWNSHIP 40 SOUTH, RANGE 4 WEST, SALT LAKE MERIDIAN, UTAH



COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action	4,413	
Reclassified by this action	600	
Prior classification		10,920
Total acres classified to date	5,013	10,920

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	9,776
Restored without classification	
Total acres not classified	9,776

Total acres in township 25,709

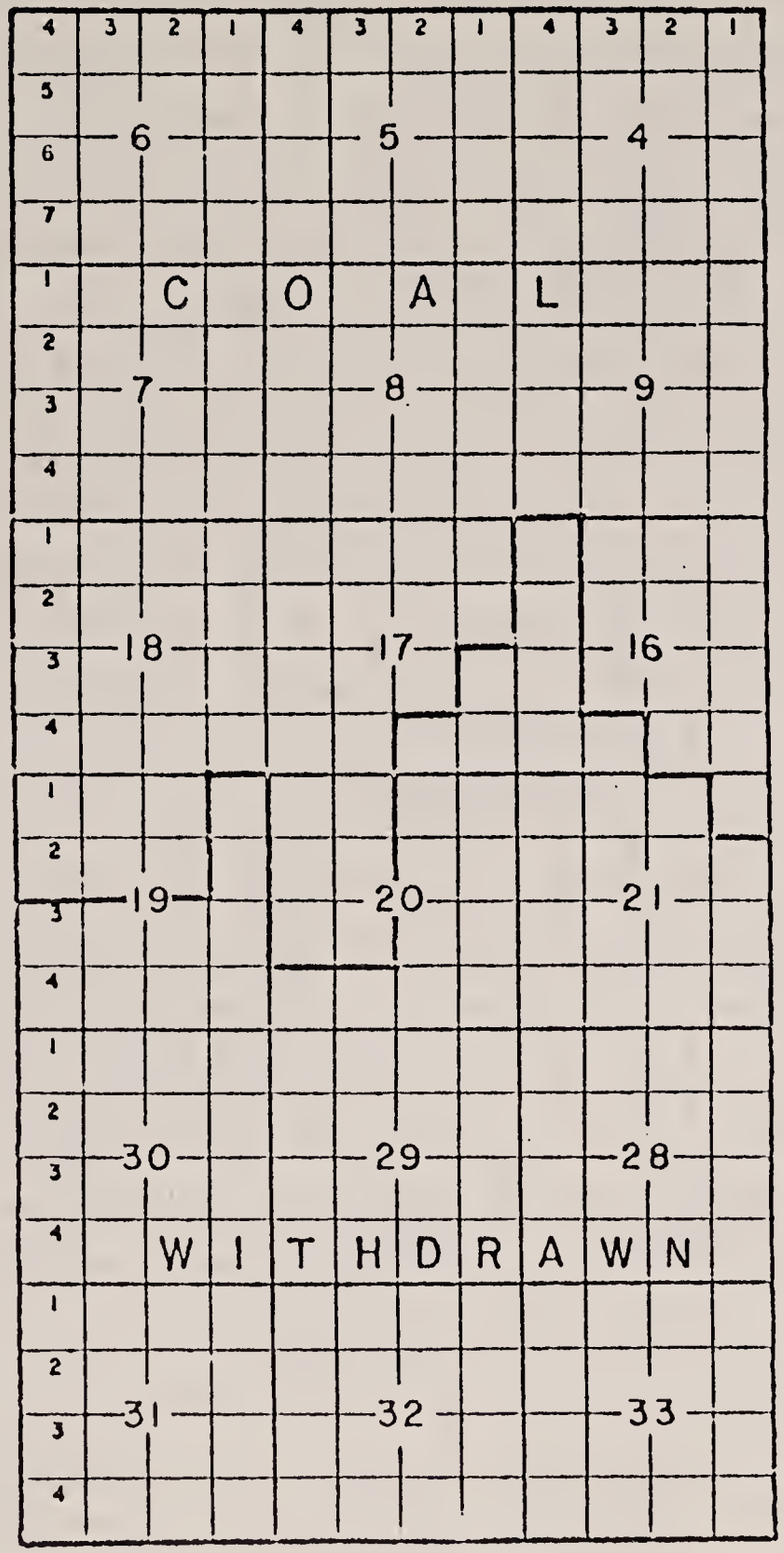
Classified on dates shown as:

- Mineral ☐
- Nonmineral ☐
- Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70 JUL 15, 1977

Restored from ....., by Public Land Order ....., published in Federal Register v. ....., p. .....

TOWNSHIP 40 SOUTH, RANGE 4½ WEST, SALT LAKE MERIDIAN, UTAH



C O A L

CLASSIFIED	Mineral	Nonmineral
Classified by this action	5,949	
Reclassified by this action		
Prior classification		
Total acres classified to date	5,949	

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	4,556
Restored without classification	
Total acres not classified	4,556

Total acres in township 11,505

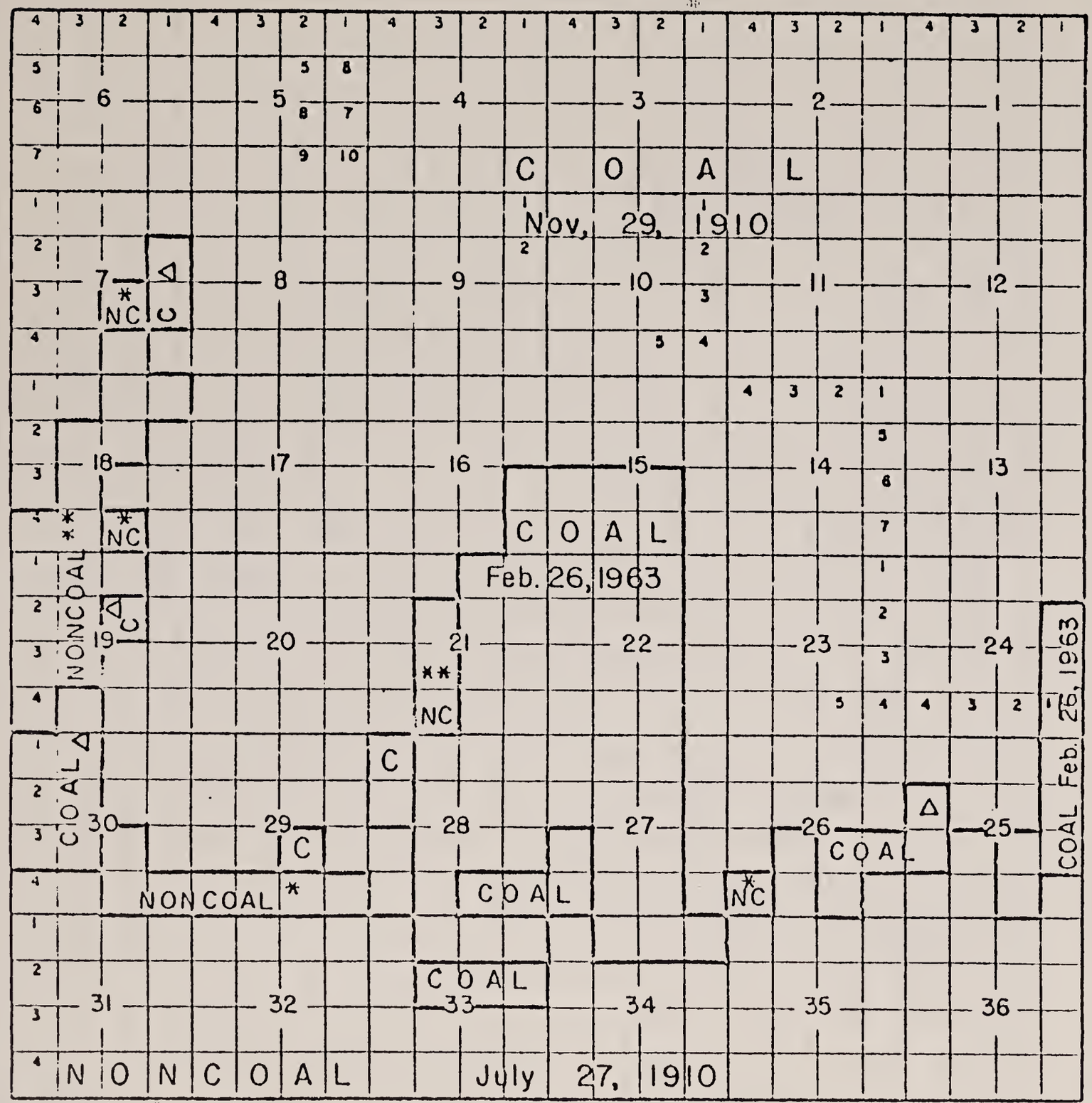
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70 JUL 15, 1977.

Restored from ..., by Public Land Order ..., published in Federal Register v. ..., p. ...

TOWNSHIP 40 SOUTH, RANGE 5 WEST, SALT LAKE MERIDIAN, UTAH



△ Feb. 26, 1963 * Feb. 26, 1963 ** July 27, 1910

COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action		
Reclassified by this action	400	
Prior classification	17,427	4,999
Total acres classified to date	17,827	4,999

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	
Restored without classification	
Total acres not classified	

Total acres in township 22,826

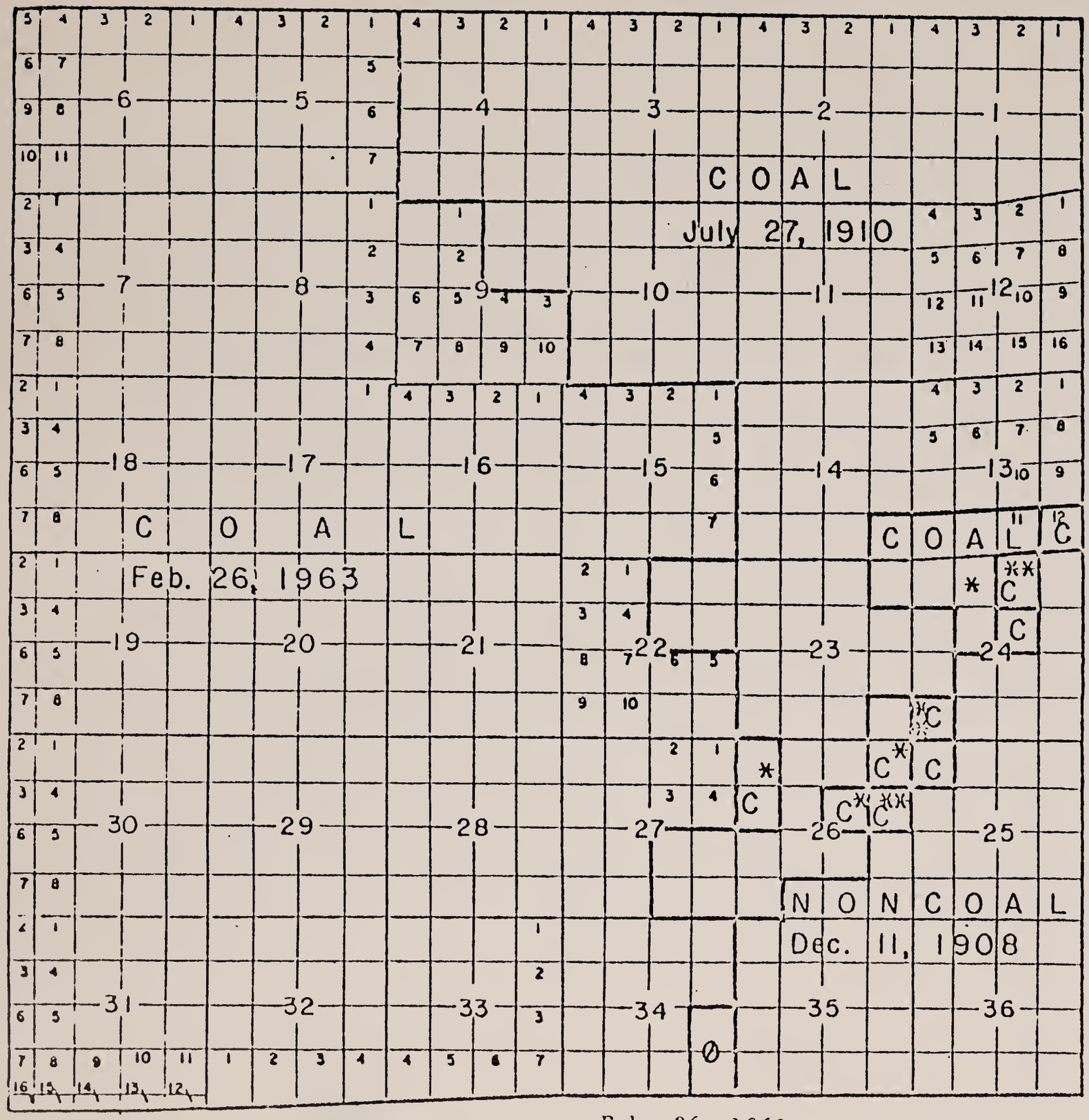
Classified on dates shown as:

Mineral ☐
Nonmineral ☐
Not classified ☐

New classification approved by the Director, U. S. Geological Survey, JUL 8, 1977, published in Federal Register v. 42, p. 36569-70 JUL 15, 1977.

Restored from ....., ..., by Public Land Order ....., published in Federal Register v. ....., p. ....., ...

TOWNSHIP 40 SOUTH, RANGE 7 WEST, SALT LAKE MERIDIAN, UTAH



* Dec. 11, 1908 ** Feb. 26, 1963 Ø NONCOAL - Feb. 26, 1963

COAL

CLASSIFIED	Mineral	Nonmineral
Classified by this action		
Reclassified by this action	118	
Prior classification	21,112	2.440
Total acres classified to date	21,230	2.440

NOT CLASSIFIED	
Not withdrawn	
In outstanding withdrawal	
Restored without classification	
Total acres not classified	

Total acres in township 23,670

Classified on dates shown as:

- Mineral ☐
- Nonmineral ☐
- Not classified ☐

New classification approved by the Director, U.S. Geological Survey, JUL. 8, 1977, published in Federal Register v. 42, p. 36569-70, JUL. 15, 1977.

Restored from ....., ..., by Public Land Order ....., published in Federal Register v. ....., p. ....., ...

United States Department of the Interior

GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

JUN 25 1973

Memorandum

To: Regional Conservation Managers, Central Region, Eastern Region, Western Region

Area Office Heads (Onshore)

From: Chief, Conservation Division

Subject: Implementation of Secretary's Order 2948 and 2952 - Definition of areas subject to competitive leasing

Secretary's Order 2948 (October 6, 1972) requires that the Geological Survey provide the Bureau of Land Management with determinations as to whether "lands are within a known geologic structure (KGS), a known geothermal resource area (KGRA), or a known leasing area (KLA). This instruction memorandum confirms previous oral discussions.

A. With respect to KGS determinations we have had a responsive, ongoing program for many years. A new delegation effective June 1, 1973, provides that the formal definition of Known Geologic Structures of producing oil and gas fields is delegated to Regional Conservation Division Managers.

Henceforth, KGS minutes will be entitled 'Minutes of the Mineral Land Evaluation Committee" instead of 'Mineral Land Classification Board." The Committee for KGS minutes will be chaired by the appropriate Area Geologist and will have two other geologists as members. The minutes will be approved by the Regional Manager instead of a Board. The Regional Manager will also sign the KGS plat.

B. With respect to KLA determinations for leasable minerals other than oil and gas and geothermal resources, our ongoing program and rate of progress has been less than satisfactory. In order to correct this situation we must clarify our objectives and procedures and give increased emphasis to this important work.

This matter has become increasingly urgent with the need to meet the implications of Secretary's Order 2952 (February 13, 1973) with regard to the immediate need for

establishment of known coal leasing areas (KCLAs). The decision to stop issuance of prospecting permits for coal and to provide only for issuance of preference right leases and competitive leases greatly increases our need to identify KCLAs quickly. In order to expedite this work I am requesting that the following modified procedures be followed pending revision of sections 613.4.3. and 617.4.1 of the Division manual and full implementation of Division reorganization objectives:

(1) Area and District Geologists and Area and District Mining Supervisors will jointly review all records of previously rejected permit applications, starting with coal, and will prepare KLA minutes and plats to encompass those areas where current information still warrants the previous decision that competitive leasing is necessary. This will quickly establish KLAs encompassing areas previously decided to contain valuable leasable minerals in workable quantity and quality.

(2) The above procedure will also be applied to all prior "informal" KLAs maintained by either the former Branch of Mining Operations or the Branch of Mineral Classificatic

(3) The above procedure will also be applied to areas currently under lease and areas formerly under lease unless there is new evidence to warrant their exclusion.

(4) The above procedure will also be applied to obvious areas not included in 1-3 above. We will not take time now to detail the fringe areas, which can be accomplished later or handled on a case-by-case basis as need arises.

Primary emphasis should be placed on establishment of Known Coal Leasing areas to provide for implementation of the President's Energy message for orderly and timely resource development, and for the need to identify competitive leasing areas as implied in the Secretary's Order 2952.

Areas established under steps 1-4 above will not only provide for quick identification of competitive areas but will provide a nucleus for enlargement with more detailed study.

Minutes for KLAs should be prepared in accordance with Exhibit 1 Part 613 Ch. 4 Conservation Division Manual with the following exceptions:

(1) "Minutes of the Mineral Land Classification Board" will be changed to "Minutes of the Mineral Land Evaluation Committee."

(2) Both the Area Geologist and Mining Supervisor will sign as members with the Regional Manager as Chairman.

(3) Review will be by Staff Branch Chiefs for Onshore Evaluation and Mining Operations rather than the two former Branches listed.

(4) Approval will be by the Division Chief rather than a 3 member board.

The plat required will be prepared in accordance with Exhibit 2, Part 613, Chap. 4, Conservation Division Manual, except that the Chief, Conservation Division will be substituted for the Director as the classifying officer

Copies of pertinent parts of the Division Manual with indicated changes are attached to aid in expediting these instructions.

C. With respect to KGRA determinations we have a responsive, on-going program which will be modified somewhat in the proposed regulations by the definition of "Competitive Interest." For the present, please use the same procedure for KGRAs as those outlined above for KLAs with the exception that the petroleum engineers involved will be listed in the heading, the Area Oil and Gas Supervisor be substituted for the Area Mining Supervisor on the Committe and the Branch of Onshore Oil and Gas Operations be substituted for the Branch of Mining Operations in the review section.

N.A.
See new instruction 6/74

D. Copies of all Minutes and plats, whether for KGSs, KGRAs, or KLAs, will be furnished to this office for review purposes. In addition the maps now furnished on a semi-annual basis by Area Geologists showing defined and undefined KGS outlines will also include in the future the outline of all KLAs and KGRAs. These maps should reflect status as of the beginning of the calendar and fiscal years.

Chief, Conservation Division

Enclosure

File: ....(State).... ....(mineral) ~~Land~~ Leasing Minutes No. ...1/

Minutes of the Mineral Land ~~Classification Board~~ Evaluation Committee

Date: .....

Subject: ....(name).... Leasing Area

~~Classification Committee Present~~ Minutes Prepared by: (Name geologist(s) and mining or petroleum engineer(s) preparing and reviewing data.)

In consultation: (Include geologist(s) and/or mining or petroleum engineer(s) participatin

(Outline)

1. Introduction.
2. Legal Considerations.
3. History of ...mineral... Exploration, Discovery and Development.
4. General Factors.
   A. Location.
   B. Physiography.
5. Stratigraphy.
6. Structure.
7. Description of Mineral Deposit.
8. ~~Classification~~ Evaluation Standards.
9. Basis for ~~Classification~~ Evaluation.
   A. Geologic.
   B. ENGINEERING (Technologic)
   C. Economic.
10. Description of Land in Leasing Area.
11. References.

Submitted and recommended by the Committee:

_____

Area {Geologist Member

_____

Area {Mining or Petroleum Engineer Member

_____

~~Minutes by:~~ ~~(Author's name)~~

{Regional ~~Geologist~~ Manager, Chairman
~~or (Regional Mining Supervisor)~~

Reviewed by: _____ Date: _____
Branch of ~~Mineral Classification~~ Onshore Evaluation

_____ Date: _____
Branch of Mining Operations Onshore or Oil and Gas Operations

....(State).... ....(mineral) ~~Land~~ Leasing Minutes No. ..

(Last page ~~should~~ may have some text in addition to signatures)

Approved by: ~~Mineral Land Classification Board:~~

~~(Geologist)~~ Chief, Conservation ~~Member~~ Division

(Geologist) Member

(Branch Chief, Mining) Member

(Branch Chief) Chairman

Date: _____

1/ This number will be ~~supplied by the Washington office in a numerical series separate from the classification minutes series.~~ applied serially to Mineral Land Evaluation Committee Minutes for each mineral in a given State.

~~2/ Geologists and Mining Engineers as shown under Classification Committee Present.~~

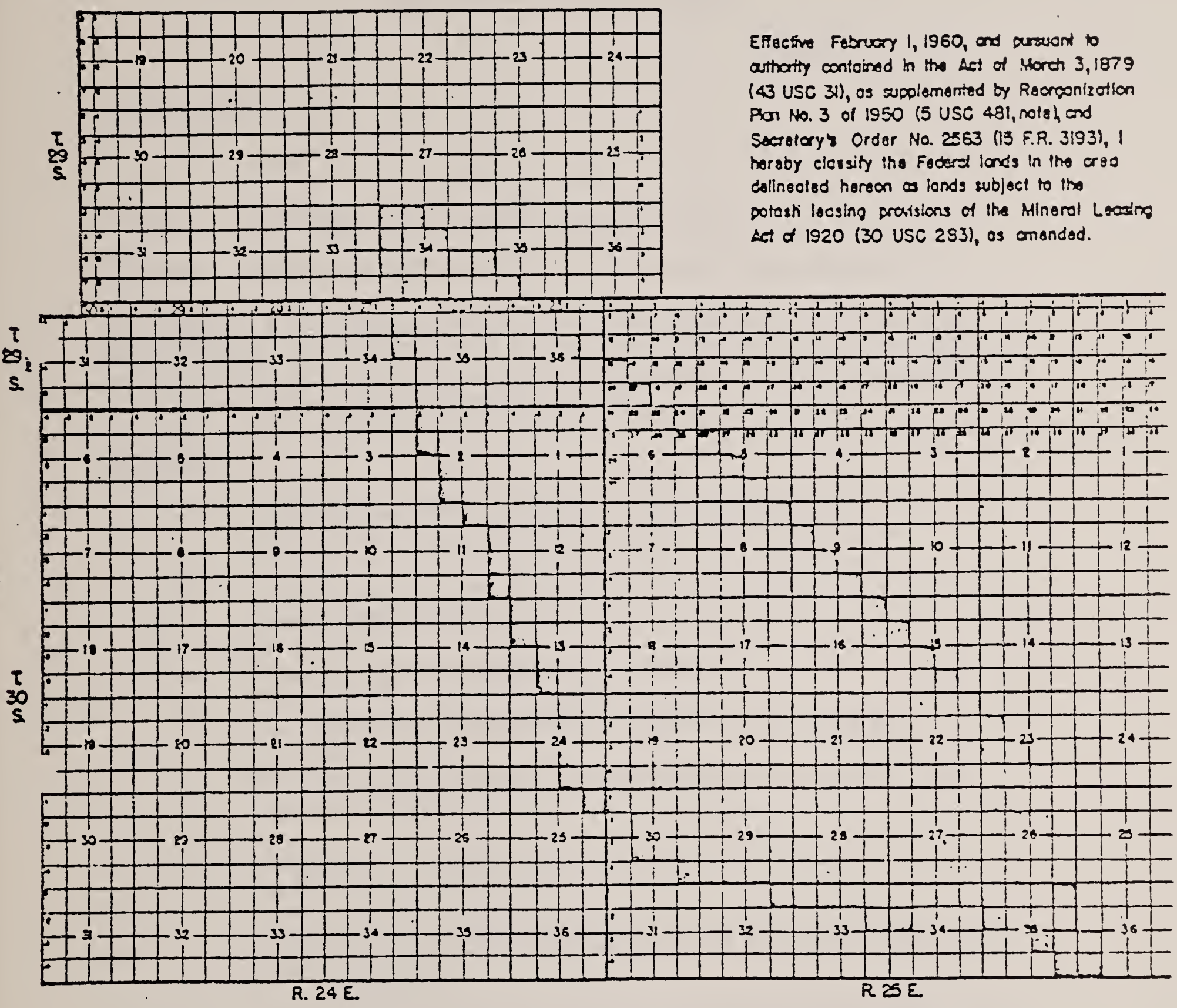
Distribution: Original for Washington office; if prepared in field the desired number of copies will be returned; if prepared in Washington the desired number of copies will be forwarded to the appropriate office.

Part 613, Chapter 4.

LISBON VALLEY POTASH AREA

Ts. 29-29½ S., R. 24 E., T. 30 S., Rs. 24-25 E., S.L.M., Utah

Effective February 1, 1960, and pursuant to authority contained in the Act of March 3, 1879 (43 USC 31), as supplemented by Reorganization Plan No. 3 of 1950 (5 USC 481, note), and Secretary's Order No. 2563 (15 F.R. 3193), I hereby classify the Federal lands in the area delineated hereon as lands subject to the potash leasing provisions of the Mineral Leasing Act of 1920 (30 USC 283), as amended.



Total area subject to lease

16,178 acres

CHIEF, CONSERVATION ~~ACTING DIRECTOR~~ DIVISION
U. S. Geological Survey

May 18, 1960

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

December 29, 1976

Memorandum

To: File

From: Geologist, Pacific Area Geologist's Office

Subject: Guidelines for Known Phosphate Leasing Area minutes, etc.

Enclosed are a collection of instructions I have received over the past year on format etc. for KPLA's, letter to the State Director and Federal Register notice. Examples of each are enclosed. Our secretaries should be familiar with these instructions for upcoming minutes.

Minutes

- -- Number minutes in sequence as they are forwarded. If not certain, leave space blank and Reston will fill in number.
- -- Indicate distribution of minutes on the minutes, they will be distributed by Reston.
- -- Type 1 original and put on tape (Xerox).
- -- Use "executive correspondence" folders for minutes etc.
- -- Run off seven copies and enclose tables and appropriate maps with each set of minutes.
- -- Last page of minutes has to include part of the text. It is not to be a signature page by itself..
- -- Write "Acting Regional Manager" as long as appropriate on last page of minutes
- -- Use blue signature tabs on next to last page, so that when turned over it will show the copy to be signed.
- -- The minutes and 7 copies have to be signed by all committee members.

Use enclosed Paris-Bloomington KPLA minutes for format, style, etc.

Idaho Phosphate Land Leasing Minutes No. 3

Minutes of the Mineral Land Evaluation Committee

Date:

Subject: Paradise Valley Known Phosphate Leasing Area, Bingham and Caribou Counties, Idaho

Committee present: Peter Oberlindacher, Henry Cullins, Leo Saarela, Hillary Oden

In Consultation: C. Brook, R.D. Hovland, Peter Marsh (mining engineer)

Introduction

The Paradise Valley KPLA, located within the Paradise Valley and Cranes Flat 15 minute topographic quadrangle maps (U.S. Geological Survey, 1917-1918), includes portions of T. 4-5 S., R. 40 E., Boise Meridian, Idaho. The area is located 25 miles southeast of Blackfoot and about 25 mi northwest of Soda Springs.

Much of the area is readily accessible by improved light duty roads and unimproved dirt roads. The mainline of the Union Pacific railroad passes within 20 mi to the south of the KPLA.

All units of measurement are in English. The conversion factors in the table below may be used to convert to metric equivalents:

foot (ft) multiply by 0.305 to obtain meter (m)
mile (mi) multiply by 1.61 to obtain kilometer (km)
acre multiply by 0.405 to obtain hectare (ha)

Previous Investigations

The geology and phosphate resources have been described by Mansfield (1927, 1952) and Service (1966).

History of Development

Federal phosphate leases I-016, I-0997, and I-2272 cover a large portion of the KPLA. There is no active mining within the boundary of the KPLA. The nearest operating phosphate mine is about 20 mi to the southeast.

Physiography

The Paradise Valley KPLA lies along the southwestern slope of an unnamed, northwest-trending homoclinal ridge in the southern portion of the Blackfoot Mountains. This area is part of the transition zone between the fault-block topography of the Basin and Range province and topography resulting from complex folding and faulting of the southeastern Idaho overthrust belt of the Middle Rocky Mountain province. The trend of mountain ridges and principal valleys in the area is controlled by the northwest strike of fold axes and faults in folded Paleozoic and Mesozoic marine strata. Ridges are locally subdued and modified, as in the northwestern part of the KPLA, where Neogene and Quaternary volcanics and clastic deposits overlie the older strata and structures.

Elevations within the KPLA range from 6,200 to 6,927 feet above sea level. Paradise Valley, an apparent erosional feature now mostly filled with Neogene and Quaternary deposits, lies to the northeast at an elevation of about 6,300 ft. The Blackfoot River lies to the southwest at about 6,000 ft and is separated from the KPLA by an intervening ridge. Drainage of the area is by intermittent streams and the Blackfoot River.

Stratigraphy

The geology and stratigraphy of the Paradise Valley KPLA are shown on the accompanying geologic map. The lowermost stratigraphic section exposed in the KPLA is Wells Formation of Pennsylvanian age (Girty in Mansfield, 1927, p. 73) and Mansfield (1952). It has been suggested by Williams (1943), by McKelvey (1949) and substantiated by Douglass (cited in Cressman, 1964) that the upper part of the Wells Formation is Permian in age. Mansfield (1952) divides the Wells Formation (in this area) into a lower unit of sandy and cherty massive limestone beds, a middle sandstone unit, and an upper siliceous and calcareous sandstone unit which locally grades into a siliceous limestone. The upper unit is similar in lithology to the Grandeur Member of the Permian Park City Formation (see descriptions by Cheney and others in McKelvey and others, 1959, p. 15). However, correlation of the Grandeur with the upper unit of the Wells Formation has not been made at this locality. The general thickness of the Wells Formation in the KPLA ranges from 2,500 to 3,000 ft.

The Wells Formation is unconformably overlain (as indicated by Mansfield, 1952, p. 17) by the Phosphoria Formation of Permian age. The Phosphoria Formation consists of two members: (1) a phosphate shale member as described by Mansfield (1952, p. 23) and redefined by McKelvey (1959) as the Meade Peak Phosphatic Shale Member, and (2) the overlying Rex Chert Member. The Meade Peak which contains the economically important

phosphate zones will be discussed in greater detail below. The thickness of the Meade Peak Phosphatic Shale Member is from 90 ft in sec. 22, T. 2 S., R. 39 E., to 145 ft in sec. 34, T. 4 S., R. 40 E., (Mansfield, 1952, p. 25). The thickness of the overlying Rex Chert Member varies in its different exposures from about 350 to more than 500 ft.

The Triassic strata unconformably overlying the Phosphoria Formation were mapped as the Woodside Shale by Mansfield (1927, 1952) but are referred to in this report as the Dinwoody Formation as redefined by Kummel (1953, p. 167-171). The Thaynes Group (Mansfield, 1927) and the Ross Fork limestone of the Thaynes Group (Mansfield, 1952) which overlies the Dinwoody Formation have been redefined as the Thaynes Formation by Kummel (1954). Since the various members of the Thaynes Formation have not been mapped in detail within the KPLA, the Thaynes Formation is shown as undivided.

The lower part of the Dinwoody Formation (Woodside Shale) consists of platy, sandy, and calcareous shales. Limestone beds are more abundant in the middle and upper parts of the formation (Mansfield, 1952, p. 29). The thickness of the Dinwoody Formation is estimated at 2,000 ft. The Thaynes Formation (Thaynes Group as described by Mansfield, 1952, p. 30) consists of lower and upper limestone members separated by calcareous sandstones and sandy and cherty limestones. The thickness of the Ross Fork Limestone of the Thaynes Group as mapped by Mansfield (1952) in the KPLA is estimated at 1,350 ft.

In the northwestern portion of the KPLA, the Paleozoic and Mesozoic strata are unconformably overlain by rocks of the Pliocene Salt Lake Formation. The Salt Lake Formation most commonly consists of conglomerates with sporadic occurrences of limestone, calcareous clay, sandstone, and volcanic ash beds. The Salt Lake Formation is horizontal to gently tilted and apparently formed as extensive blanket, now greatly eroded, over much of the older strata. Its thickness in the area is more than 2,000 ft.

Patches of rhyolitic rocks — welded tuff — overlie the Salt Lake Formation and older strata along the south and northwestern margins of the KPLA. The patches of tuff are apparent remnants of another extensive blanket which was deposited over hill and valley alike. The thickness of the welded tuff varies in different parts of the area but thicknesses up to 25 ft are common. Quaternary olivine basalt flows are exposed a short distance north of the southern end of the KPLA but do not crop out within the KPLA. The basalts underlie Paradise Valley and converge with the Willow Creek lava field to the east (see Mabey and Oriel, 1970).

Lower slopes and valleys are covered with hill wash and alluvium. A small patch of Pleistocene (?) travertine is exposed at the southeastern end of the KPLA.

Structure

Paleozoic and Mesozoic strata in the area of the subject KPLA have been folded around northwest-trending axes. The KPLA includes the limb of a northwest-striking, southwest-dipping faulted homocline.

The Meade Peak Phosphatic Shale Member extends in a relatively unbroken outcrop for 4 mi, striking northwest and dipping 55° to 75° southwestward. A northwest-trending normal fault is located to the southwest of the member. This fault, southwestern side down, parallels the phosphate outcrop for almost its entire length. The fault has an estimated displacement of 5,000 ft in the southeastern portion of the KPLA (Mansfield, 1927). Several transverse faults displace the Meade Peak as much as 200 ft, in a horizontal direction. Mansfield (1952, plate 2) shows the Meade Peak and other strata cut off at depth by a thrust fault (Mansfield's "Bannock Overthrust").

Phosphate

As indicated earlier in this report, economically significant deposits of phosphate are found within the Meade Peak Phosphatic Shale Member of the Permian Phosphoria Formation. The Meade Peak is composed of interbedded phosphate rock, phosphatic shale, siltstone, shale, sandstone, and limestone. Within the KPLA, the Meade Peak ranges from 145 to 170 ft in thickness. The Meade Peak is commonly poorly exposed and weathers to form a characteristic swale between the more competent underlying Wells Formation and overlying Rex Chert.

In general, rich phosphate beds occur in two zones, one near the bottom and the other near the top of the Meade Peak Member. The phosphate-rich zones are separated by a zone of waste rock. Only the footwall (bottom) zone has been measured and sampled in the subject KPLA. A 24.5 ft section measured by Mansfield (1927) near the footwall of the Meade Peak is reported by Service (1966) to average 29 percent P_2O_5. A high-grade bed nearly 6 ft thick within the footwall zone ranges from 30 to 34 percent P_2O_5. The following information in Table I has been abstracted from the published trench data.

Table 1

From U.S. Geol. Survey Professional Paper 152
SE¼SE¼, sec. 34, T. 4 S., R. 40 E.
Field Number M-129-16

Sample Nos.	Thickness (feet)	Avg. P_2O_5 (in percent)	Lithologic Description
	lower zone		
	top not exposed	---	sandy clay
	1.3	not analyzed	phosphate rock
sample 1	2.0	28.7	phos. rock, shaly
	2.0	not analyzed	phosphate rock
sample 2	1.3	25.0	phos. rock, shaly
	1.8	not analyzed	phosphate rock
	.3	---	limestone
	.3	not analyzed	phos. rock, shaly
sample 3	1.7	29.8	phosphate rock
sample 4	1.7	25.5	phosphate rock
sample 5	1.7	21.7	phosphate rock
sample 6	1.7	33.2	phosphate rock
	.7	not analyzed	phosphate rock
sample 7	1.8	31.3	phosphate rock
sample 8	1.8	30.2	phosphate rock
	.3	---	limestone
sample 9	1.3	28.3	phosphate rock
sample 10	2.0	28.3	phos. rock, shaly
sample 11	1.1	30.0	phosphate rock
sample 12	1.8	33.0	phosphate rock
sample 13	1.8	33.3	phosphate rock
sample 14	1.8	30.2	phosphate rock
	1.0	not analyzed	phos. rock, shaly

Basis for Evaluation

Supporting evidence for this evaluation was derived from U.S. Geological Survey trench data, Federal phosphate lease information, and published geologic data on the subject area. The thickness, grade, and extent of the phosphate are sufficiently known to include the deposits in a Known Phosphate Leasing Area (KPLA).

The specific criteria used to outline the boundary of the Paradise Valley Known Phosphate Leasing Area are as follows:

(1) The minimum thickness of the phosphate rock is 20 ft with a weighted average of 24 percent P_2O_5.

(2) The dip and other structural data were utilized to determine the depth to which the outcrop data should be extended in order to define the Known Phosphate Leasing Area. Where the phosphate rocks are steeply dipping and the structure uncomplicated, those 40 acre tracts cut by the Meade Peak were included in the KPLA. Where the section is shallow dipping, the 40-acre tracts cut by the Meade Peak, and the nearest 40-acre tract down dip were included in the KPLA. The remaining areas that have complex geologic structure were outlined to include mainly the outcrop of the Meade Peak under less than 600 ft of overburden.

(3) The phosphate beds are capable of being worked for the extraction of phosphatic materials by conventional surface and (or) underground mining methods.

References Cited

Cressman, E. R., 1964, Geology of the Georgetown Canyon - Snowdrift Mountain area, southeastern Idaho: U.S. Geol. Survey Bull. 1153, p. 18-29.

Kummel, B., Jr., 1954, Triassic stratigraphy of southeastern Idaho and adjacent areas Wyo. Mont. : U.S. Geol. Survey Prof. Paper 254, p. 165-194.

Mabey, D.R., and Oriel, S.S., 1970, Gravity and magnetic anomalies in the Soda Springs Region, southeastern Idaho: U.S. Geol. Survey Prof. Paper 646-E, p. E1-E15.

Mansfield, G.R., and Girty, G.H., 1927, Geography, geology, and mineral resources of part of southeastern Idaho: U.S. Geol. Survey Prof. Paper 152, 452 p., pl. 2.

_____, 1952, Geography, geology, and mineral resources of the Ammon and Paradise Valley Quadrangles, Idaho: U.S. Geol. Survey Prof. Paper 238, 92 p., pl. 1.

McKelvey, V.E., 1949, Geologic studies of the western phosphate field, in Symposium on western phosphate mining: Am. Inst. Min. Met. Eng. Min. Trans., v. 184, p. 270-279.

_____, 1959, The Phosphoria, Park City and Shedhorn Formations in the Western Phosphate Field: U.S. Geol. Survey Prof. Paper 313-A, p. 1-41.

Service, A.L., 1966, An Evaluation of the Western Phosphate Industry and its resources, Part 3, Idaho: U.S. Bur. of Mines, Report of Investigations 6801, 201 p.

Williams, J.S., 1943, Carboniferous formations of the Uinta and northern Wasatch Mountains, Utah: Geol. Soc. America Bull., v. 54, p. 591-624.

On the basis of the information cited, it is recommended that the following described lands including approximately 1,348.94 acres, more or less, be included in the Paradise Valley Known Phosphate Leasing area.

Boise Meridian, Idaho

T. 4 S., R. 40 E.
- sec. 28, SW¼, S½SE¼
- sec. 29, SW¼NE¼, NW¼, NE¼SW¼, N½SE¼, SE¼SE¼
- sec. 30, NE¼NE¼
- sec. 33, N½NE¼, SE¼NE¼
- sec. 34, Lots 1 and 2, SW¼NE¼, NW¼, NE¼SW¼, N½SE¼
- sec. 35, Lots 3, 4

T. 5 S., R. 40 E.
- sec. 2, Lots 2, 3, 4

It is recommended that November 20, 1975, the date that this study was completed, be the effective date of this action.

Submitted and recommended by the Committee:

_____
Geologist — Member

_____
Area Geologist — Member

_____
Area Mining Supervisor — Member

_____
Acting Regional Manager — Chairman

Reviewed by: _____ Date: _____
Branch of Onshore Evaluation

_____ Date: _____
Branch of Mining Operations

Approved by: _____
Chief, Conservation Division

cc: Chief, CD (Attn: ADC Resource Evaluation, Stop 640)
Conservation Manager, Western Region
Area Geologist, Pacific Area
Area Mining Supervisor, Alaska-Pacific Area
Chief, Br. of Mineral and Water Classification
Area Geologist, Central Region
District Mining Supervisor, Pocatello, Idaho

Federal Register Notice

- -- Type without errors, erasures, corrections.
- -- Leave at least a 1-inch margin at the top, bottom, and right side; a 1½-inch margin at the left.
- -- Signature of Director to be placed on a page which also includes some material that can be identified with the text (see example).
- -- Type 1 original (on tape), plus 2 tissue copies.
- -- Make 7 copies.
- -- Put signature tab in front of signature pages (signature tabs are available from the warehouse).
- -- Don't staple pages together.
- -- Use "executive correspondence" folder.
- -- Use enclosed sample memo for format.

MINUTES

Original plus 7 Xerox copies (include all tables, maps, etc. in Xerox copies)

1 white copy
1 green copy (Regular AG copies)
1 yellow copy

STATE DIRECTOR LETTER (BLM)

Original On Reston letterhead

Copies: 2 copies on Reston tissue letterhead (indicate cc's on one tissue copy only)

1 carbon copy is to be on white bond paper

1 green copy
1 white copy Regular AG copies)
1 yellow copy

Note: All copies carry the cc indication except original and one Reston tissue copy.

FEDERAL REGISTER NOTICE

Original and 2 tissue copies, plus 7 Xerox copies

1 white copy
1 green copy (AG regular copies)
1 yellow copy

Note: See sample for correct line spacing on the Federal Register Notice

The following information applies to all documents submitted for publication in the FEDERAL REGISTER: Rules and regulations, notices of proposed rulemaking, and general notices.

1. Original document. (See 1 CFR 18.1.)

The original document submitted by an agency becomes a part of the National Archives of the United States and should have the appearance of a formal document prepared for public inspection. It should be typed on 8- by 10½-inch bond paper and be signed in ink by the agency official issuing the document.

Printed or electrostatic copies or computer printouts may be used as originals provided the copies are of high quality, have the appearance of a formal document, and are signed in ink.

For discussion on use of computer data in a document see item 8 of this Chapter.

2. Copies. (See 1 CFR 18.1, 18.5, 18.6.)

Two legible copies must be submitted with each original document. These copies may be submitted in one of two forms:

(a) *Certified copies.*—These copies are not signed in ink by the issuing official. Instead, a statement reading substantially as follows is typed or stamped on each copy: "Certified to be a true copy of the original document." This statement must be signed by the agency's certifying officer (appointed under 1 CFR 16.1). If time is pressing and the regular certifying officer is not available, certification may be made by a line superior of the certifying officer or by an official having authority to appoint a certifying officer. The name and title of the signer of the original must be typed or stamped on all copies at the appropriate position. (If the document is printed on two sides, submit three copies, not two.)

(b) *Duplicate originals.*—Instead of having copies certified, an agency may choose to have all copies signed in ink by the issuing official. No certification is necessary as the "copies" are, in fact, duplicate originals.

Whether certified copies or duplicate originals are submitted, they must be legible and identical with the original.

CAUTION.—Do not omit pages, assemble pages out of order, or include pages from an earlier draft—one of the certified copies (or duplicate originals) is placed on public inspection and the other is edited and sent to the printer.

3. Format. (See 1 CFR 18.4, 18.7, 18.8.)

Use bond paper approximately 8 by 10½ inches in size. Leave a 1-inch margin at the top, bottom, and right side and a 1½-inch margin at left. Number all pages consecutively. (See example on this page.)

Double space all primary text. Single space:

(a) Tables of sections (part tables of contents).

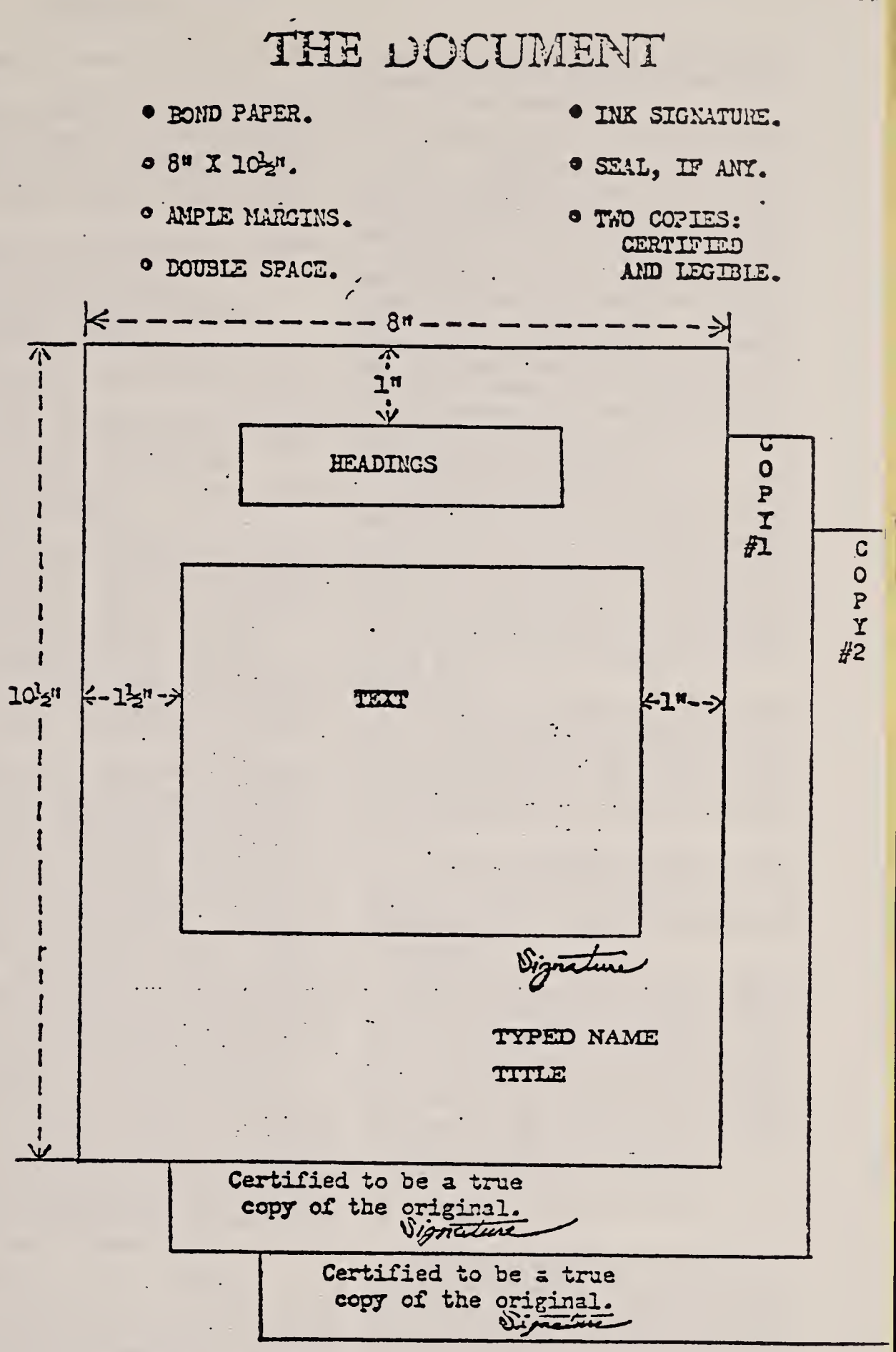
(b) Authority statements in rules documents.

(c) Lists of items.

(d) Quoted material when set apart from regular text, not "run-in."

A signature of the issuing official should never be placed on a page by itself. The signature page should always include some material that can be identified with the text.

The agency seal is not required. If used, it must not cover any text on the original or copies.



4. Style. (See 1 CFR 18.9.)

For punctuation, capitalization, spelling, compounding, and similar matters follow the "U.S. Government Printing Office Style Manual" (available from Superintendent of Documents, Government Printing Office).

For spelling of geographic names, use "Foreign Names Decisions" (Office of Geography, Department of the Interior) "Domestic Name Decisions and Decisions in U.S. Territories and Possessions

(Geological Survey, Department of the Interior), and "Board on Geographic Names Gazetteers" (Superintendent of Documents, Government Printing Office).

For land descriptions, use "Specifications and Descriptions of Tracts of Land for Use in Executive Orders and Proclamations" (Bureau of Land Management, Department of the Interior, or Superintendent of Documents, Government Printing Office).

5. Illustrations. (See 1 CFR 18.10.)

Pictorial material is very expensive to reproduce in the FEDERAL REGISTER and usually delays publication of a document. Only when necessary for compliance purposes and for an understanding of the text of the document should maps, diagrams, graphs, or other pictorial material be included in documents.

If it is determined that an illustration is essential, the original artwork or clear reproduction must be included with the original document and the copies. Moreover, if an illustration is to be amended at a subsequent date, a complete new drawing must be submitted with the amendatory document.

6. Tabular material. (See 1 CFR 18.10.)

Tables may be included where necessary or useful. However, since tables are expensive to set in type and may delay publication, their use should be restricted to cases where a clear benefit is derived.

7. Forms. (See 1 CFR 18.11.)

Tabulated blank forms for reports, applications, contracts, and similar matter for rulemaking documents are not generally published in the FEDERAL REGISTER. The prescription for the use of such forms and any procedural or substantive instructions appearing on the forms should be included in the text of the document, and one copy of the form attached. The FEDERAL REGISTER will carry a footnote to the effect that the form is "filed as part of the original document," showing availability of copies as pertinent.

After consultation with the Office of the Federal Register, certain forms may be published in notices of proposed rulemaking documents if the commenters must see the form in order to comment adequately on the proposal.

8. Computer-produced documents.

Agencies that have computer data that will eventually be included in documents submitted for publication should consult with the Office of the Federal Register before preparation of such documents. It may be possible to use a magnetic tape of such material in the printing process. As mentioned in item 1 of this chapter, computer printouts may also be deemed acceptable in documents.

9. Submission of documents. (See 1 CFR 18.3.)

Documents may be delivered to the Office of the Federal Register, 633 Indiana Avenue NW., Washington, D.C., between 8:45 a.m. and 5:15 p.m., Monday through Friday, except for Federal holidays.

Documents sent through the regular mail should be addressed to:

The Office of the Federal Register
National Archives and Records Service
Washington, D.C. 20408

For interagency mail service, the post office stop is 220.

NOTE.—Letters of transmittal are not necessary and are discouraged unless special handling or treatment is requested.

10. Scheduling for publication. (See 1 CFR 17.2, 17.3, 17.6.)

Each document is assigned to the "regular" publication schedule unless special arrangements are made for publication under "emergency" or "deferred" schedules. The schedules are as follows:

(a) "Regular schedule" provides for publication 3 working days after the date of receipt of the document—e.g., received Monday, filed Wednesday, published Thursday.

(b) "Emergency schedule" is designed to provide the fastest possible publication of documents involving the prevention, alleviation, control, or relief of any emergency situation—either 1- or 2-day service. Requests for emergency publication should not be made lightly. However, if the need is clearly shown, the potential benefits are substantial and printing schedules permit, the request will be granted. For 1-day service—the deadline for receipt of documents to be published under the emergency schedule is noon of the day preceding publication date.

(c) "Deferred schedule" is used whenever more time is needed to handle lengthy or complex material, or the issuing agency requests a deferred publication date. Advance consultation with the Office of the Federal Register on unusually difficult documents is the surest way to avoid delays in publication.

11. Filing. (See 1 CFR 17.1, 18.13.)

After a document is received by the Office of the Federal Register, it is held for confidential processing until it is filed for public inspection at the Office of the Federal Register. No information will be released, except to the issuing agency, about either the document, its contents, the scheduled filing date, or the publication date, until it has been placed on public inspection. Each document is filed for public inspection the day before the scheduled publication date, unless the issuing agency requests an earlier filing date.

The original of each document is filed for permanent record purposes in the National Archives and Records Service, of which the Office of the Federal Register is a constituent unit.

12. Corrections. (See 1 CFR 18.14, 18.15.)

Before a document is submitted to the Office of the Federal Register, the original and certified copies should be doublechecked for errors. One certified copy is placed on display for public inspection and the other is sent to the Government Printing Office for typesetting. Thus, a mistake in a certified copy, or a mistake in the original carried through to a certified copy, may result in an error in the FEDERAL REGISTER. Additional errors occur from the omission, misplacement, or duplication of a page, or the inclusion of a page from an earlier draft.

Correction tape should never be used. It may become detached and errors would result in the printed version or in the permanent record (the original document) stored in the National Archives and Records Service. If it is necessary to make minor changes in a document after it has been typed, mark all copies neatly in ink and initial the margins opposite the change.

If an error is discovered in a document before it is filed for public inspection, the document may be recalled by the issuing agency for correction. Simple corrections may, in some cases, be made by telephoning the FEDERAL REGISTER staff.

If an error is discovered after a document is filed for public inspection, the document may be corrected only by the issuance of a correction document by the agency.

After publication, the FEDERAL REGISTER should be proofread for errors against a copy of the original document. If an error was made in the publication process and the original document was correct, the Office of the Federal Register will prepare and publish a correction statement. If the error was made in the original document, the agency must issue a signed correcting document.

13. Combined documents. (See 1 CFR 18.2.)

A separate document must be submitted for each category of publication in the FEDERAL REGISTER—"Rules and Regulations," "Proposed Rules," and "Notices." It is also necessary to submit separate documents for each chapter of the CFR. Documents combining chapters present production problems at both the Office of the Federal Register and at the U.S. Government Printing Office.

14. Highlights. (See 1 CFR 18.16.)

A highlight should be written in layman's language. It must contain: A catchword or short headnote that captures the subject of the highlight, the name of the issuing agency, and a one to three-line description of the document.

The Office of the Federal Register prefers to use agency-submitted highlights, but reserves the right to edit and prepare entries for this valuable, informative portion of the daily issue.

When drafting highlights, the following guidelines apply:

(a) Use common words, with few or no technical terms.

(b) Use headnotes that are eye-arresting.

(c) Use active terms which state the full impact of the document.

(d) Be concise.

HIGHLIGHT EXAMPLES

Chapter IV—Guidelines for Drafting Codified Documents

PART A—CODE OF FEDERAL REGULATIONS

Item

1. Title.
2. Chapters.
3. Parts.
4. Sections.
5. Paragraphs.

PART B—DRAFTING RULEMAKING DOCUMENTS

6. Headings.
7. Preambles.
8. Words of issuance.
9. Adoption of proposals.
10. Body text.
11. Citations of authority.
12. Effective date statements.

Appendix A—Checklist for Rules Document/Illustration.

Appendix B—Suggestions on Choice of Language.

Rules and regulations are generally "subject to codification." Regulatory documents must be prepared therefore as amendments to the Code of Federal Regulations (CFR). Such documents add, remove, or change provisions appearing in the CFR. In the case of a provision which expires after a specified period by its own terms, a document must be published which so states. (See 1 CFR 21.6)

UNITED STATES

DEPARTMENT OF THE INTERIOR

Geological Survey

KNOWN LEASING AREA (PHOSPHATE)
Paradise Valley, Idaho

Pursuant to the authority contained in the Act of March 3, 1879 (43 U.S.C. 31), as supplemented by Reorganization Plan No. 3 of 1950 (43 U.S.C. 1451, note), 203 Departmental Manual No. 1, and Secretary's Order No. 2948, Federal lands within the State of Idaho have been classified as subject to the competitive phosphate leasing provisions of the Mineral Leasing Act of Feb. 25, 1920, (30 U.S.C. 211), as amended.

The name of the area, the effective date, and the total acreage involved are as follows:

(12) Idaho

Paradise Valley (Idaho) Known Leasing Area
(Phosphate); November 20, 1975, 4523.51 acres

A diagram showing the boundaries of the area classified for competitive leasing has been filed with the appropriate land office of the Bureau of Land Management. Copies of the diagram and the land description may be obtained from the Regional Conservation Manager, Western Region, U. S.

State Director Memorandum

- - Addressee: a) Original on Survey (Reston) letterhead
  b) Courtesy copy on Survey letterhead tissue
  Note: If you need Reston letterhead paper call the Onshore minerals section: 8-928-7567.

- - Don't date Memo.

- - No distribution list on original copy (see distribution list below).

- - Run 7 xerox copies (in addition to two originals).

- - Attach blue signature tab on original (Reston letterhead).

- - Attach surname tab on Reston letterhead tissue copy.

- - The tissue copy has to be signed and dated by committee.

- - The current distribution list is shown on enclosed Paris-Bloomington State Director Memo.

- - Enclosed Stewart Flat memo is current format to be used.

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

Memorandum

To: State Director, Bureau of Land Management
Boise, Idaho

From: Chief, Conservation Division

Subject: Establishment of the Paradise Valley Known Phosphate Leasing Area, Idaho

Effective November 20, 1975, the Paradise Valley known phosphate leasing area has been established in southeastern Idaho as subject to the competitive phosphate leasing provisions of the Mineral Leasing Act of February 25, 1920, (30 U.S.C. 211), as amended.

The description of the contained lands are as follows:

Boise Meridian, Idaho

T. 4 S., R. 40 E.
sec. 28, SW¼, S½SE¼
sec. 29, SW¼NE¼, NW¼, NE¼SW¼, N½SE¼, SE¼SE¼
sec. 30, NE¼NE¼
sec. 33, N½NE¼, SE¼NE¼
sec. 34, Lots 1 and 2, SW¼NE¼, NW¼, NE¼SW¼, N½SE¼
sec. 35, Lots 3, 4

T. 5 S., R. 40 E.
sec. 2, Lots 2, 3, 4

Federal lands may be affected by this determination. We will publish notice of the action in the Federal Register as appropriate. Queries with respect to the known leasing area should be addressed to the Conservation Manager, Western Region, or to the Area Geologist, Pacific Area, Menlo Park, California 94025.

Chief, Conservation Division

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

Public Law 91-190
91st Congress, S. 1075
January 1, 1970

An Act

To establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy Act of 1969".

National Environmental Policy Act of 1969.

PURPOSE

SEC. 2. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

TITLE I

DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

SEC. 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

Policies and goals.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may—

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

Administration.

SEC. 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

Copies of statements, etc.; availability.

81 Stat. 54.

(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(E) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(F) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(G) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(H) assist the Council on Environmental Quality established by title II of this Act.

Review

SEC. 103. All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

SEC. 104. Nothing in Section 102 or 103 shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

SEC. 105. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

TITLE II

COUNCIL ON ENVIRONMENTAL QUALITY

Report to Congress.

SEC. 201. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

Council on Environmental Quality.

SEC. 202. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

SEC. 203. The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

80 Stat. 416.

Duties and functions.

SEC. 204. It shall be the duty and function of the Council—

(1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 201;

(2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

(3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

(4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

(5) to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;

(6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

(7) to report at least once each year to the President on the state and condition of the environment; and

(8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

SEC. 205. In exercising its powers, functions, and duties under this Act, the Council shall—

(1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

34 F. R. 8693.

(2) utilize, to the fullest extent possible, the services, facilities, and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

SEC. 206. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5313). The other members of the Council shall be compensated at the rate provided for Level IV or the Executive Schedule Pay Rates (5 U.S.C. 5315).

Tenure and compensation. 80 Stat. 460, 461.

81 Stat. 638.

SEC. 207. There are authorized to be appropriated to carry out the provisions of this Act not to exceed $300,000 for fiscal year 1970, $700,000 for fiscal year 1971, and $1,000,000 for each fiscal year thereafter.

Appropriations.

Approved January 1, 1970.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 91-378, 91-378, pt. 2, accompanying H. R. 12549 (Comm. on Merchant Marine & Fisheries) and 91-765 (Comm. of Conference).
SENATE REPORT No. 91-296 (Comm. on Interior & Insular Affairs).
CONGRESSIONAL RECORD, Vol. 115 (1969):
July 10: Considered and passed Senate.
Sept. 23: Considered and passed House, amended, in lieu of H. R. 12549.
Oct. 8: Senate disagreed to House amendments; agreed to conference.
Dec. 20: Senate agreed to conference report.
Dec. 22: House agreed to conference report.

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

JUL 9 1976

Memorandum

To: Assistant Division Chiefs
Conservation Managers
Area and District Mining Supervisors
Area and District Geologists

From: Acting Chief, Conservation Division

Subject: Environmental Analysis Procedures and Guidelines for Onshore Mining Operations

The subject procedures and guidelines have been developed to provide uniform guidance for Conservation Division personnel in preparing environmental analyses for onshore mining operations. Comments received on previous draft procedures have been incorporated into these procedures where practical.

These procedures and guidelines are effective as of July 12, 1976, and will be utilized on an interim basis until final procedures are distributed after field testing and review. The field testing period will run until December 1, 1976. Your comments and recommendations concerning these procedures and guidelines should be submitted to the Chief, Conservation Division, Mail Stop 630, after the field testing period is completed, but no later than January 1, 1977. These procedures and guidelines supersede all previous instructions concerning preparation of environmental analyses for onshore mining operations.

Russell G. Wayland
Acting Chief, Conservation Division

Enclosure

Preparation of Environmental Analysis
for Onshore Mining Operations

These procedures and guidelines become effective on
July 12, 1976

These procedures and guidelines supersede
all previous instructions regarding preparation
of environmental analyses for mining operations.

TABLE OF CONTENTS

I. Purpose

These procedures establish uniform methods for the preparation and processing of environmental analyses for all onshore mining operations supervised by the Conservation Division, U.S. Geological Survey, and are designed to assure documented consideration of environmental values at all levels of planning and decision making within the Division.

II. Objectives

A. To document in a uniform, systematic manner, the environmental effects of proposed actions subject to Conservation Division approval.

B. To determine whether or not an environmental impact statement should be prepared on the proposed action, pursuant to NEPA, Section 102(2)(C).

C. To establish procedures for the processing of completed environmental analyses.

III. Authority

A. National Environmental Policy Act of 1969 (Public Law No. 91-190, approved January 1, 1970; 42 U.S.C. 4331-4349).

B. Executive Order 11514, Protection and Enhancement of Environmental Quality (March 5, 1970).

C. Council on Environmental Quality, Guidelines for Preparation of Environmental Impact Statements (38 F.R. 20550-20562, August 1, 1973; 40 CFR 1500).

D. Department of the Interior Manual, Environmental Quality, 516 DM2.

E. U.S. Geological Survey Manual 516.2.

IV. Policy

It is Conservation Division policy to document, through preparation of an environmental analysis, the potential environmental impacts of proposed actions submitted for approval when these proposed actions are technically and administratively complete and in acceptable form. Each environmental analysis is to be prepared in accordance with these procedures and guidelines and is to be made a part of the permanent case files.

V. Responsibility

A. Area and District Mining Supervisors.

(1) Prepare environmental analyses of proposed actions, including assessing alternatives and developing and recommending measures to minimize, to the fullest practical extent, the environmental impacts of the proposed action.

(2) Consult with appropriate Federal and State agencies and other sources of environmental expertise not available within Geological Survey for input into environmental analyses.

(3) Consult, as needed, with other Divisions within Geological Survey for input into environmental analyses.

(4) Render an opinion on the need for preparation of an environmental impact statement to the Conservation Manager in cases where the analysis indicates that approval of the proposed action would constitute a "major Federal action significantly affecting the quality of the human environment" pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969 or "proposed major actions, the environmental impact of which is likely to be highly controversial" (40 CFR 1500.6)

(5) Forward those environmental analyses that express the opinion that an environmental impact statement is needed or that meet the special criteria listed in Section XIII of these procedures to the Conservation Manager.

(6) Take appropriate administrative actions on a proposal upon clearance of the environmental analysis through established processes set forth in these procedures and guidelines.

B. Conservation Managers.

(1) Review environmental analyses forwarded from the Area and/or District Supervisors expressing the opinion that an environmental impact statement is needed or that meet the special criteria established in Section XIII of these procedures and guidelines.

(2) Render an opinion, by memorandum, concurring with, or contrary to, that expressed by the Area and/or District Supervisor on the need for preparation of an environmental impact statement.

(3) Forward to the Chief, Conservation Division (Mail Stop 630), those environmental analyses expressing the need for preparation of an environmental impact statement; that meet the special criteria established in Section XIII of these procedures and guidelines; or that require Department or Survey policy decision on the action.

(4) Return environmental analyses to the preparing office for modification, rewriting, or administrative action.

(5) Establish the review and approval procedures to be used within his region for processing those environmental analyses that express the opinion that the proposed action does not require preparation of an environmental impact statement.

(6) Establish a quality control program to insure that all environmental analyses prepared in the region conform to these procedures and guidelines.

C. Chief, Conservation Division.

(1) Develops, maintains, and evaluates Division policy and procedures for preparation of environmental analyses.

(2) Coordinates the processing and review of environmental analyses forwarded by the Conservation Managers.

(3) Transmits to the Director, Geological Survey, those environmental analyses that express the need for preparation of an environmental impact statement or that meet the special criteria set forth in Section XIII, along with a recommendation for or against preparation of an environmental impact statement.

(4) Informs the Conservation Manager of actions forwarded to or taken by the Director, Geological Survey, or the Department of the Interior.

(5) Periodically reviews environmental analyses for conformance with established environmental procedures and guidelines.

VI. Actions Requiring Preparation of an Environmental Analysis.

A. Exploration Plans--An environmental analysis will be prepared for each exploration plan submitted for approval.

B. Mining Plans/Partial Mining Plans--An environmental analysis will be prepared in accordance with these procedures and guidelines for each mining plan, partial mining plan, or supplement to a partial mining plan submitted for approval, including:

(1) Plans submitted for new surface or underground mines.

(2) Long-term plans submitted for the continuation of ongoing surface or underground operations involving Federal lands and/or minerals.

(3) Plans submitted for ongoing surface or underground mines on private lands that are to enter Federal lands and/or minerals for the first time.

(4) Plans submitted for ongoing surface or underground operations on private lands that propose to reenter Federal land and/or minerals and that are not covered by an existing environmental analysis and approved plan.

C. Modification of an approved exploration or mining plan.

(1) An environmental analysis will be prepared for a modification of an existing approved mining or exploration plan if an environmental analysis was not previously prepared on the existing approved plan.

(2) If an environmental analysis was prepared on the existing approved plan, the analysis and modification to the plan are to be reviewed and an environmental analysis prepared under the following criteria:

(a) If no additional significant environmental impacts will result from the proposed modification, a brief supplemental analysis will be prepared stating the nature of the proposed action, that the existing analysis and plan were reviewed, and that no additional significant environmental impacts will result. A completed standard matrix (Exhibit I), appropriate opinion statement, and clearance from appropriate Federal and State agencies will be included as part of the supplemental analysis and the supplement attached to the original environmental analysis.

(b) If minor environmental impacts will result from the proposed modification, a supplement to the original environmental analysis will be prepared setting forth those impacts not discussed in the original analysis. The supplemental analysis, new standard matrix, opinion statement, and clearance from appropriate Federal and State agencies are to be included in the supplemental environmental analysis and attached to the original analysis.

(c) If major environmental impacts will result from the proposed modification, a new environmental analysis will be prepared according to these procedures and guidelines.

VII. Exclusions.

An environmental analysis is not required for a new mine plan if the Geological Survey or the Department of the Interior has determined that an impact statement will be prepared and that the proposed new mine will be included in the environmental impact statement.

The Area or District Supervisor will prepare a memorandum to the Chief, Conservation Division, Mail Stop 630, stating that: "An environmental analysis has not been prepared for (company name, name of mine, lease number, location) because of the decision by the (Secretary of the Interior or Director, Geological Survey) on (date) that an environmental impact statement for (Title) will be prepared, and the subject mine plan will be included in this environmental statement."

In some cases, a preliminary review of a proposed action may clearly indicate that an environmental impact statement will be required without the benefit of a detailed environmental analysis. In such instances, the Area or District Mining Supervisor will prepare and forward, through appropriate Division channels, a brief memorandum describing the proposed action, including an opinion statement and a copy of the plan.

VIII. Consultation.

A. The Area or District Mining Supervisor will provide the Area or District Geologist with a copy of the applicant's proposed action, along with a written request for review of the geology described in the proposed action, a review of potential multiple mineral development problems and, in consultation with Water Resources Division when needed, a review of water problems. The comments received from the Area or District Geologist are to be used in preparation of the environmental analysis. Both the requesting memorandum and the comments received from the Area or District Geologist are to be attached to the environmental analysis.

B. The Area or District Mining Supervisor will contact, in writing, the appropriate surface managing agency (State Director, BLM; Forest Supervisor, FS; Area Director, BIA; Park Superintendent, NPS; District Engineer, Corps of Engineers) to determine if that agency has any additional actions pending in the area and to obtain their advice, comments and, when required, their concurrence on the proposed action. Tribal comments and concurrence, when required, must also be obtained. The comments received from the surface managing agency are to be used in preparation of the environmental analysis. The requesting memorandum, comments received, and concurrence of the surface managing agency and Indian Tribe, where appropriate, are to be attached to the analysis.

C. The Area or District Mining Supervisor will contact, as needed, appropriate Federal, State, and local agencies with regulatory responsibilities or special expertise for their assistance in providing input to the environmental analysis, including other Divisions within the Geological Survey. A copy of each request for information and response received are to be attached to the environmental analysis.

D. If the presence of endangered or threatened plant or animal species is indicated by the surface managing agency or any other Federal or State agency, or if information is not available on the presence or absence of such species, the Area or District Mining Supervisor will contact, in writing, the Fish and Wildlife Service requesting information on endangered or threatened plant and animal species and critical habitat for these species in the area of the proposed action. A copy of the request and the response from Fish and Wildlife Service will be attached to the environmental analysis. Data supplied by the surface managing agency, other Federal or State agencies, or FWS will be used in preparing the environmental analysis.

Further instructions on compliance with the Endangered Species Act of 1973 are in preparation and will be issued as an Instruction Memorandum shortly.

IX. Onsite Inspection.

The Area and/or District Mining Supervisor, upon receipt of a proposed plan will arrange for an onsite inspection. The appropriate surface managing agency must be invited to participate in the inspection and, as needed, the Area or District Geologist, environmental scientist, applicant, Fish and Wildlife Service, and any other Federal, State, and local agencies known or likely to have a specific interest in the area of the proposed action. At the time of the onsite inspection, the matrix (Exhibit I) will be completed to assure that the various factors that may have an impact on the environment are considered prior to initiating preparation of the environmental analysis. Onsite inspections may not be required if all agencies having interest in the area notify the Area or District Supervisor, in writing, that their inspection or participation is not necessary.

X. Public Notice.

A. In order that the public may be better informed and have an opportunity to comment on new mine plans, major modifications in existing surface mine plans, or surface related change in existing underground plans submitted to the Area or District Mining Supervisor for approval, the following procedure will be followed for all proposed actions, except those dealing with coal, which fall under the provisions of 30 CFR 211.5.

(1) A notice of availability of any proposed plan will be promptly posted on the office bulletin board and a copy mailed to the appropriate county clerk for posting. Once each month, a consolidated copy of the postings will also be sent to appropriate Conservation Managers and Division Headquarters. If there have been no proposals, a monthly memorandum so stating will be distributed.

(2) The notices will show name of lessee or operator, lease number, location, and county involved. One copy of the plan should be prepared so that proprietary data is excluded. At the bottom of the notice, the public will be advised that this plan is available for inspection at the office of the District or Area Mining Supervisor (Exhibit II) and that a 30-day period is allowed for interested parties to comment on the plan.

Public comments received will be considered in preparing the environmental analysis and in approving the plan.

(3) Exhibit III is a suggested transmittal letter to be used in sending the notices of proposed plan to the appropriate county clerks.

XI. Public Meetings.

Public meetings can provide one means of assessing the degree of public interest and the degree of controversy associated with the environmental impacts of a proposed plan. Public meetings for coal mining operations are covered under 30 CFR 211.5. The procedures described herein deal only with discretionary public meetings for non-coal mining operations.

The Area or District Supervisor will consult with the Conservation Manager and the Chief, Conservation Division, in those instances when the Supervisor determines that a discretionary public meeting is warranted prior to completion of the environmental analysis.

If a discretionary public meeting is to be held, Departmental Manual 455 DM 1, release number 1571, August 31, 1973, subject: Legal-Discretionary Public Hearings, will serve as a guide in arranging the public meeting.

XII. Review Procedures.

A. An environmental analysis that expresses the opinion that the proposed action does require an environmental impact statement, that meets the special criteria set forth in Section XIII of these procedures and guidelines, or requires policy review will be forwarded (two copies) to the Conservation Manager. The Conservation Manager will review the environmental analysis for completness and accuracy and return it to the Area or District Supervisor for modification, additional information, or rewriting, as needed; or will forward it to the Chief, Conservation Division, Mail Stop 630. The Conservation Manager will either concur or disagree with the findings of the analysis on the determination page prior to forwarding the analysis to the Chief.

B. Each Conservation Manager will determine the review and approval procedures to be used within his region for handling those environmental analyses that determine that the proposed action does not require an environmental impact statement.

XIII. Special Criteria.

Any proposed action that meets the following criteria must be forwarded to the Conservation Manager and then to the Division Chief:

A. Secretarial memorandum dated January 24, 1973, requires:

> "To insure continuing careful attention to the environmental significance of proposed resource development, all major Federal actions significantly affecting the quality of the human environment regarding resource development, and, in addition, all actions of any kind regarding development of coal related to the Southwest and Northern Great Plains covered by the June 16, 1971, and June 30, 1972, memoranda referred to above shall be submitted to the Under Secretary for review and concurrence prior to execution." (Emphasis added.)

This Secretarial memorandum was interpreted by the Chief, Conservation Division, in his memorandum of June 5, 1973, to mean:

> The phrases ". . . other actions relating to development of coal," and ". . . all actions of any kind regarding development of coal . . .," are literally more encompassing than what we think was the intent of the instruction. We do not believe that Secretarial review would be required for operations with a relatively minor impact on the environment, such as exploration involving only shallow drilling and the use of existing roads, or minor modifications in existing underground and surface mine plans where little or no additional surface modification or environmental impact will result.
>
> We interpret the instruction, therefore, to mean that Secretarial review is required before we approve mining plans in the two areas for all new or significantly modified surface and underground mining operations on Federal or Indian lands. Accordingly, pending further clarification and effective immediately, mining plans and environmental analyses for such operations should be sent to this office for appropriate action.

XIV. Guidelines for Preparation of Environmental Analysis.

A. Introduction.

These guidelines set forth the basic format for an environmental analysis and the principal environmental factors that should be addressed in the analysis. Most basic data for the analysis are to be supplied by the applicant as part of his proposed plan submittal to the Conservation Division. Applicant's engineering and environmental data must be checked for accuracy and completeness by the Area or District Supervisor and must be adequately referenced or documented in the applicant's proposed plan prior to use in preparing the environmental analysis. Basic data may be obtained from the surface managing agency and other Federal or State agencies or supplied by consultants under contract to the Geological Survey. Data supplied under contract also must be checked for accuracy, completeness, and appropriate referencing or documentation prior to inclusion in the analysis. Company's confidential information is not to be included in the environmental analysis.

Each environmental analysis will include the following sections:

I (1) Description of Proposed Action

II (2) Environmental Considerations of the Proposed Action

III (3) Alternatives to the Proposed Action

IV (4) Adverse Environmental Effects of the Proposed Action.

Each environmental analysis will also include a matrix analysis, recommendation and determination statement, reference, appendices, and maps.

B. Title Page.

The title page will contain the following information:

(1) Project or mine name

(2) Lease number

(3) County and State of lease location

(4) Company name

(5) Date of preparation of environmental analysis, dates of revision of environmental analysis

(6) Name and address of preparing office.

I Description of the Proposed Action.

This section briefly summarizes the nature and scope of the proposed action. The following information should be included:

(1) Company name

(2) Lease location (township, range, section, county, State)

(3) Name of surface owner of record and status of agreement to disturb private surface by mining activity

(4) Date of filing of application or plan with Conservation Division; date of filing with State and date of State approval

(5) Objectives of the proposal

(6) History of the lease and operation

(7) Size and location of well bores, water supplies, pits, entries, drill pads, roads, power lines, waste disposal, sewage treatment transport routes, storage, etc. related to the proposal

(8) Suitable maps showing details of the proposed project layout

(9) Description of proposed mining and reclamation sequence, including equipment to be used (capacities, power source, pollution control, etc.)

(10) Approximate starting and completion dates

(11) Surface disturbing aspects of the project, including all structures, waste and tailings disposal, overburden and topsoil handling, water impoundments, and fire prevention and control

(12) Surface reclamation plan, enforcement agency, and enforcement procedures (including profile of premining and proposed post mining land surface)

(13) Water uses for the proposed project

(14) Mix of land surface and mineral ownership

(15) Actions required of other Federal and State agencies and Indian Tribes that relate to the proposed action before Conservation Division

(16) Nearby pending actions (leasing actions, actual or planned mines nearby, development of overlying or underlying minerals, etc.) relating to the same mineral industry or different mineral industries before Conservation Division or the surface managing agencies

(17) Any requests for variances from performance standards

(18) Proposed abandonment procedures.

II A. Environmental Considerations of the Proposed Action

This section contains an analysis of the existing environment the probable impacts of the proposed action on the environment, and various methods available to further reduce or prevent environmental degradation, beyond those proposed and/or required by law or regulations Emphasis should be placed on those environmental values that may be affected by the proposed action, with particular attention to the unavoidable adverse effects. The cumulative effects of the proposed action, combined with any other minerals-related activities that exist or are planned for the area, must also be evaluated. The following environmental considerations should be used as a basic checklist for preparing this section. Those items that may affect, or be affected by, the proposed action must be documented and discussed in this section, along with steps to further mitigate any adverse environmental effects which will be imposed as a special condition if approved.

(1) Geology--A geologic review for each proposed action is to be requested from the Area Geologist.

(a) Regional Physiography (description and maps).

(b) Stratigraphy (cross section showing estimated thickness and lithology).

(c) Structure (description and map of regional and local structural features).

(d) Nature of mineral deposit (size, thickness, grade, trace elements).

(e) Presence of other mineral resources on or adjacent to lease and methods to protect these resources.

(f) Overburden characteristics (type, thickness, and chemical and physical parameters).

(g) Known or suspected paleontological values.

(h) Geologic hazards (landslides, erosion, subsidence, seismic activity).

Sources of data: Area Geologist, USGS publications, State Geological Survey publications, company data when validated, contract data.

(2) Soils--Those characteristics of soils that may affect reclamation activities, as well as methods of improving soils for plant growth, must be documented and discussed in this section.

(a) Soil types present (description and map).

(b) Soil thickness.

(c) Physical parameters (texture, strength, stability).

(d) Chemical parameters (pH, salinity, organic matter, nutrients, trace elements, radioactivity, and other chemical properties, as needed).

Sources of data: Soil Conservation Service, surface managing agency, State soils surveys, company data when validated, contract data.

(3) Air--Those aspects of meteorology and air quality that may affect, or be affected by, the proposed action and methods of meeting applicable standards must be documented and discussed in this section.

(a) Meteorology.

(i) Temperature (averages, extremes, variations).

(ii) Growing season and frost-free days.

(iii) Precipitation (annual, seasonal means and extremes), form of precipitation, and evaporation rates.

(iv) Wind speed and direction (patterns and seasonal variations).

(v) Severe weather occurrences (inversions, storms, flooding, ice movement).

(b) Air Quality.

(i) Present air quality.

(ii) Potential air pollution sources.

(iii) Air quality standards for area.

Sources of Data: U.S. Weather Service (NOAA), EPA, State Air Quality agencies, company data when validated, contract data.

(4) Water--Those aspects of surface and ground water hydrology, water quality, and water use which the proposed action may affect and methods of mitigating these effects and meeting water quality standards must be documented and discussed in this section.

(a) Surface and ground water.

(i) Location of surface water and present use (description and map).

(ii) Proximity and relationship of surface water to proposed action, proposed diversions of natural drainages, present use of alluvial valley floors.

(iii) Stream flow rates and surface storage potential.

(iv) Process water demands and sources.

(v) Potential percolation losses from tailings ponds, impoundments, and similar structures.

(vi) Location of aquifers and water table.

(vii) Ground water recharge areas.

(viii) Water well locations and present use of water.

(ix) Process water source.

(x) Well drilling and abandonment practices and potential for comingling of fresh and saline waters.

(xi) Potential disruption of aquifers through subsidence or mining.

(b) Water quality.

(i) Surface water quality) pH, total dissolved solids, temperature, specific conductivity biological oxygen demand, radioactivity

(ii) Ground water quality)

(iii) Water quality monitoring sites and parameters to be measured.

(iv) Use of water control structures.

(v) Siltation potential.

(vi) Pollution potential (acids, alkali, termal, toxic substances, trace element, sewage).

Sources of Data: Geological Survey (Water Resources Division), EPA, State water control agencies, company data when validated, contract data.

(5) Land Use--Those aspects of land use that may be affected by the proposed action and methods of mitigating adverse environmental effects must be documented and discussed in this section.

(a) Existing land use at site and immediately surrounding lands (description and maps) and proposed post mining land use.

(b) Surrounding land use (communities, transportation, recreation, agriculture, etc.)

(c) Architectural, cultural, historical, and archeological site locations and clearance.

(d) Nearby scenic and aesthetic sites.

(e) Mined land reclamation potential.

(f) Potential for land to support proposed use after mining, including past mine reclamation success or failure within the general area of the mine.

(g) Location of nearby occupied structures.

(h) Potential subsidence from mining and monitoring for subsidence.

Sources of Data: Surface managing agency, SCS, State Historical Preservation Officer, National Registry of Historic Places, universities, company data when validated, contract data.

(6) Fauna and Flora--The impact upon plants and animals by the proposed action and methods to mitigate impacts must be documented and discussed in this section.

(a) Plant species and communities to be disturbed or destroyed.

(b) Animal species and communities to be disturbed or destroyed.

(c) Nesting or breeding areas and migration routes to be disturbed or destroyed.

(d) Endangered and threatened species of plans and animals or their habitat that may be jeopardized (required under Endangered Species Act of 1973).

(e) Potential for and desirability of establishing vegetative cover as proposed in the plan.

Sources of Data: Fish and Wildlife Service, State game management agencies, surface management agencies, company data when validated, contract data.

(7) Socio-Economic--Socio-economic conditions that may be impacted by the proposed action and methods to mitigate any impacts must be documented and discussed in this section.

(a) Employment anticipated at proposed mine.

(b) Availability of workers locally.

(c) Effect on local population centers.

(d) Effect on cultural resources.

(e) Availability of community services.

(f) Public opinion for or against the proposed project.

Sources of Data: Surface managing agency, local community planning agencies, BIA, community leaders, local newspapers, company data when validated, contract data.

III E. Alternatives to the Proposed Action.

This section should discuss all relevant alternatives to the proposed action or major segments of the proposed action which would result in decreasing adverse environmental impacts. The alternatives considered should be technically feasible and reasonable.

IV F. Unavoidable Adverse Environmental Effects of the Proposed Action.

Any unavoidable adverse environmental effects that will occur as a result of the proposed action, as discussed in Section XIV(D), should be summarized in this section.

G. Matrix Analysis.

A copy of the matrix analysis (Exhibit I) will be completed during the field inspection and attached to the environmental analysis.

H. Conflicts and Responses.

This section will be used to outline any controversial issues and any substantive opposing or conflicting views raised by Federal, State, or local agencies or the public during review of the proposed action. Appropriate responses to these conflicting issues or steps taken to satisfactorily resolve the issues must be included.

I. Recommendation and Determination.

The last page of the environmental analysis will contain the following paragraphs as appropriate, along with appropriate signatures, dates, and titles.

For use by Area or District Mining Supervisor when action <u>does</u> constitute a major Federal action:

> In my opinion, the proposed action <u>does</u> constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C).
>
> Signature and title of Area and District Supervisor
> Date
>
> *I (do, do not) concur _____
> Area Supervisor Date
>
> I (do, do not) concur _____
> Conservation Manager Date

*See following page.

For use by Area or District Mining Supervisor when action does not constitute a major Federal action, but is highly controversial.

In my opinion, the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C), but is highly controversial, and preparation of an environmental impact statement should be considered.

Signature and title of Area or District Supervisor
Date

*I (do, do not) concur _____
Area Supervisor Date

I (do, do not) concur _____
Conservation Manager Date

For use by the Area or District Supervisor when action does not constitute a major Federal action:

I determine that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C), and is not highly controversial.

Signature and title of Area or District Supervisor
Date

*I (do, do not) concur _____
Area Supervisor Date

J. References

Appropriate references used in preparation of the environmental analysis should be cited, listing in order: The author, title of publication, publishing company or periodical, city of publication, and date.

K. Appendices.

The following items are to be appended to the environmental analysis:

*To be used only if initial recommendation or determination is made by the District Supervisor.

Appendix 1. Reviews, reports, or information requested from Geological Survey (CD, GD, WRD, TD).

Appendix 2. Surface management agency and, when required Indian Tribal review and concurrence and related correspondence.

Appendix 3. Endangered and threatened species clearance and related correspondence.

Appendix 4. Archeological and historical site clearance.

Appendix 5. Hearing testimony, summary of public meetings, relevant correspondence, and other comments.

Appendix 6. Proposed stipulations and/or conditions for approval above those required by law or regulation.

Appendix 7. Maps and photographs.

Appendix 8. Copy of proposed plan.

L. Maps.

The following maps should be included in the environmental analysis to facilitate presentation of data and aid understanding of potential environmental impacts. All maps will include bar scale, legend, north arrow, date, and source.

(1) Regional Map--showing site location with respect to communities, transportation systems, streams and lakes, etc. USGS topographic maps at a scale of 1:250,000 are suitable.

(2) A plat showing lease location for proposed action, other surrounding Federal leases, all lease numbers, all involved company names, mine locations, mine names, and previously mined area. USGS topographic maps at a scale of 1:24,000 (7½ minute series), if available, or other maps of appropriate scale may be used.

(3) Site Specific Maps, Cross Sections, and Profiles--Appropriate maps, excluding confidential data, are to be included, showing lease area, proposed excavations and structures, geology, surface water, existing wells, land use, archeological or historical sites, critical wildlife habitat, and similar pertinent data. Stratigraphic cross sections and profiles of premining and proposed post mining land surface are to be included. Maps, cross sections, and profiles should be of such a scale to show the necessary detail. Company maps, cross sections, and profiles are acceptable and should be referenced as to source.

EXHIBIT I

Lease Number _____

Lessee (Permittee) _____

County _____ State _____

Date _____

Prepared by _____

Other Agency Representatives _____

_____

Affected Resources

	PROPOSED ACTION	Air Quality	Noise	Surface Water Quantity	Surface Water Quality	Ground Water Quantity	Ground Water Quality	Existing Land Use	Surrounding Land Use	Historical and Archeological Sites	Scenic, Recreational and Aesthetic Values	Endangered Species and Habitat	Plant Populations	Animal Populations	Nesting, Breeding or Migration Sites	Effect on Local Communities	Effect on Cultural Values	Public Health and Safety	Public Interest	Other
Construction	Roads, bridges, airports, railroads																			
	Transmission lines, pipelines																			
	Dams, impoundments, water diversions																			
	Structures (mine buildings, etc.)																			
Mining	Exploration (drilling and trenching)																			
	Surface excavation (surface mines, shafts, etc.)																			
	Subsurface excavation																			
	Storage (product, waste, spoils, water)																			
	Mineral processing and extraction facilities																			
	Post mining activities																			
Transportation	Trucks																			
	Pipelines, conveyors																			
	Railroad																			
	Other																			
Waste Disposal	Solid waste (spoils, tails, waste rock)																			
	Sanitary wastes																			
	Liquid effluent discharge																			
Accidents	Spills, leaks, explosions																			
	Geologic related hazards (subsidence, slope failure, etc.)																			
	Structure failure (dams, impoundments, etc.)																			
Other																				

INSTRUCTIONS: This matrix is to be completed during the onsite examination conducted with the surface managing agency and other agencies as required in the EA Guidelines. Adverse effects on existing conditions are to be indicated as follows: ☐ No effect ☑ Minor effect ☒ Major effect
Any beneficial effects are to be indicated by inserting a "B" in the appropriate box. Section XIV D, "Environmental Considerations of the Proposed Action" should be consulted for clarification of environmental factors to be considered in completing the matrix.

NEW MINING PLANS OR MAJOR MODIFICATIONS OF
EXISTING PLANS SUBMITTED FOR APPROVAL

Release Date _____

Date	Lessee or Operator	Lease Number	Location	County	State

A copy of the plan may be reviewed at the office location given below. Pertinent comments are solicited from anyone affected by this proposal. Such comments should be filed within 30 days from the date of this release. Response timely filed will be considered in the preparation of the environmental analysis. Responses should be addressed to the Mining Supervisor at the following address:

EXHIBIT III

COUNTY CLERK

_____

_____

_____

Dear Mr. _____:

Enclosed is a public notice listing new mining plans and/or significant revisions to previous mining plans received for action by this office. We suggest these notices be posted in some prominent place for public viewing in your office.

Sincerely yours,

_____

Enclosure

CONSERVATION DIVISION

GUIDELINES FOR THE

PREPARATION OF ENVIRONMENTAL

ANALYSES

submitted April, 1975

Introduction

These guidelines have been compiled to provide standards for considering the environmental effects of proposals under the Conservation Division's jurisdiction and to aid in implementation of our responsibilities under the National Environmental Policy Act, 1969. Each of the three parts is autonomous and has parallel structure with the other two parts.

Part A considers mining and onshore resource evaluation proposals.

Part B considers onshore oil, gas, and geothermal proposals.

Part C considers offshore oil, gas, resource evaluations, and some respects of OCS mining proposals.

These guidelines supercede all previous Conservation Division environmental guidelines listed in the reference section of this document.

TABLE OF CONTENTS

PART A

Projects Associated with

Onshore Mining,

Resource Evaluation,

Oil Shale,

and (with adaptation) OCS Mining.

CONTENTS

Part A - Projects associated with onshore mining, resource evaluation, oil shale, and (with adaptation) OCS mining proposals.

I. Definitions

A. Applicant. A lessee or permittee or one conducting operations on the leases or permit lands under the authority of the lessee or permittee.

B. Approving official. The official who normally approves an action and has the responsibility for preparing the Environmental Analysis. The approving official is usually the appropriate District Supervisor but it may be the Area supervisor.

C. Exploration program. A plan for searching for mineral deposits by surface investigations, mapping, drilling, trenching, entries, slopes, shafts, etc., under a prospecting permit or lease to determine the existence of valuable deposits in workable quantity and quality.

D. Federal Office shall mean the office of any Federal agency which may have a specific interest in the area of the proposed exploratory or mining project.

E. Leasable Minerals are those minerals described by the various Mineral Leasing Acts amended.

F. Local Public Office shall mean the office of any county, or municipality which may have a specific interest in the area of proposed project (e.g. City of County Zoning Commission, Park Commission, Environmental Council, Water Commission).

G. Locatable Minerals. Minerals under the Mining Law of 1972.

H. Mining Plans.

1. Original mining plan--a plan of development for new mining operations wherein the surface will be disturbed or altered by the mine openings and/or by its use for storage, waste disposal or the erection of associated facilities.

2. Major changes in mining plans--significant proposed deviations from an approved mining plan which may result in further disturbance of the same land or additional land from surface excavation or subsidence; or which may result in significant change in recovery or conservation of the mineral.

I. Permit Lands. Any lands or deposit under a mineral prospecting permit and subject to the regulations in 30 CFR 231.2, 30 CFR 211, and 30 CFR 216.

J. Reclamation. The measures undertaken to bring about the necessary reconditioning or restoration of land or water that has been affected by exploration, testing, mineral development, running, onsite processing operations, or waste disposal, in ways which will prevent or control onsite and offsite damage to the environment.

K. State Office shall mean the office of any State agency which may have a specific interest in the area of the proposed exploratory or mining project (e.g. State Mineral Resources Division, State Geological Survey, State Engineer, State Fish and Game; State Environmental Council).

II. Responsibility.

The guidelines and procedures herein set for are to be implemented immediately.

Approval of proposed plans will not be granted prior to environmental analysis determination.

These instructions are applicable in all instances where proposed resource evaluation, exploration plans, new mining plans or major changes in existing approved mining plans require approval.

These instructions will apply to all Federal and Indian leases and permits whether or not the surface is owned by the United States.

The approving official has the responsibility:

For assessing the environmental impact of a proposed program;

For obtaining and evaluation input from other Federal, State, and local public offices;

And for recommending whether the approval of the proposed operation will constitute a "major Federal action significantly affecting the quality of the human environment".

In assessing the overall impact of an exploration program on the environment, the approving official must assume that each venture may culminate in a producing operation.

A. EA preparation is indicated for the following types of proposals:

1. Exploratory Plans - any plan that alters existing surface or subsurface conditions, such as:

   a. Coring

   b. Trenching

   c. Geophysical surveys involving more than casual use of the land.

   d. Tunneling

   e. Exploration shafts

2. Mining Plans

   a. New mining plans

   b. Major changes in mining plans

3. Drastic modifications of existing conditions such as:

   a. Major production in area

   b. New mining technology

4. Politically sensitive areas

5. Major impacts upon natural conditions

6. Implementation of new technology

B. EA preparation is not necessary when the proposal is part of a larger program which has already been approved. A memorandum describing the current proposed action with appropriate EA references is to be submitted for Conservation Division and Regional Files. A copy should also be provided for the Environmental Section.

III. Procedures

A. In order to assure that a proposed action is developed within an approvable framework, the applicant should supply the following information:

1. For exploration and resource evaluation programs

   a. Exact location of planned project (sections, township, range, county, state)

   b. Company operator's name

   c. Commodity being sought

   d. If plan involves more than one lease, state initially and indicate scope. Identify leases.

   e. Brief but precise description of topography, soils, and geology (include extent, lithologies, significant physical characteristics and appropriate thicknesses).

   f. Describe overburden, thickness, composition, estimated removal volume, stability when disturbed.

g. Describe any potential geologic hazards and procedures to minimize them.

h. Detail scope of planned action

i. Describe auxilliary facilities.

j. Anticipated schedule of starting date and duration of project.

k. Quantity and size of equipment.

l. Resource development history of area.

m. Roads; length, right-of-way; surface, permanent/temporary

n. Archeological, Historical, and Cultural values

2. For development and full-scale mining plans

a. Summary

1) General

a) General description and map of regional features, includi topography, water resources, transportation networks, popu lation centers, cultural and recreation facilities, other mines, specific mine site, etc.

b) Description of Federal leased lands and other lands under company control to be mined, by township, range and secti and detailed location map.

c) Description and map of surface ownership and land use on leased lands and immediate surrounding lands.

d) Description and map of mineral ownership of leased lands.

e) Climatology data and description, including seasonal and annual temperatures, precipitation, wind speeds and directions, including wind rose; air quality data, such as particulates, SO_2, etc.

f) Fauna and flora, including plant and animal community type and distribution, and presence of rare or endangered speci

g) Archeological, historical, and Cultural values

2) Development Phases

a) History of permit and lease acquisition.

b) History of exploration activity.

c) History of past mining activity.

d) Production schedule. Annual production schedules until fu scale operation, planned incremental increases for life of mine.

e) Anticipated life of mine.

3) Nature and extent of deposit

a) Detailed geologic map showing drill hole locations.

b) Plan and section views of deposit.

c) Brief but precise description of topography, soils and geology (include extent, lithologies, structural features such as bedding, faults, folds, thicknesses and significa physical characteristics of the deposit and overburden). Indicate estimated removal volume, stability of overburde when disturbed and the resource and grade or quality of th commodity. Nonproprietary general information should incl such significant characteristics as trace elements and wat content.

d) Location map of structural features such as bedding, faults folds, etc.

e) Description of potential geologically-related hazards and engineering designs to eliminate or accommodate such hazards.

f) General economics of the resource.

b. Proposed Mining Plan

1) Development Drilling. Location, access, methods, time sequenc duration, depth, logging, equipment*, etc. for any development drilling.

2) Detailed Materials Handling

a) Topsoil handling and storage, including equipment*, methods time sequence, storage locations, stabilization, and replacement.

* Equipment description includes type, size, quantity, locomotion method, and power source, etc.

b) Overburden handling and disposal, including equipment*, methods (drill, blast, load, haul, dump), time sequences, disposal site conditions, alternate site locations, ration for site selection, stabilization, final shape and grade.

c) Commodity handling, including mining equipment*, transport equipment* and methods.

d) Disposal methods, e.g., tailings handling and disposal, including equipment*, methods, time sequence, location of site, alternate site considerations, rationale for site selection, stabilization, final shape and grade, location of leaching pads, chemicals, processes, pollution potentia and control.

e) Pollution control measures and practices; water, terrain and air, including transport and diffusion of plumes, if applicable.

3) Mining Sequence. A detailed description of the mining sequenc with maps showing pit expansion throughout life of the mine (minimum each year for first 5 years and 5-year intervals ther after). Resource conservation practices, cut off grade.

a) Pit development; drill, blast, load, haul, dump cycle; commodity and waste removal sequence; pit shape and depth with time; termination and abandonment practices.

b) Road construction sequence for access and pit haul roads, locations, surfacing, maintenance, dust control, and removal upon abandonment.

c) Plant and surface facility construction sequence and location.

4) Mining Equipment

a) Type (Cat. D-9 dozer or equivalent, etc.).

b) Size (cu. yds., tons, dimensions, etc.).

c) Quantity.

d) Primary use (overburden haulage, ore haulage, etc.).

e) Locomotion method (rubber tired, crawler, self-loading, et

f) Power source (electric, diesel, gasoline, etc.).

g) Pollution control measures and practices on equipment.

* Equipment description includes type, size, quantity, locomotion method, and power source, etc.

5) Mine Plant Facilities. Detailed description and location map of all facilities, including size, location, use, major equipment and processes, chemical types and quantities, pollution control measures (air, dust, noise, water), termination and abandonment plans.

6) Power Resource System. Location, size, capacity, and source of primary distribution network to and within mine site.

7) Water Requirements

a) Surface and ground water yields, pump tests, recharge, quality, including trace element analysis, infiltration, permeability, drainage basins, etc.

b) Potable water supply source, quality, distribution and quantity, including treatment facilities.

c) Sanitary waste disposal network and treatment.

d) Industrial water supply source, water budget, distribution quality, use requirements, mine related drainage faciliti treatment facilities, and pollution control measures for surface and ground water.

8) Personnel Requirements

a) Construction stage.

b) Mining stage.

c) Type of employees (skills, management, staff, etc.).

d) Labor market and minority hiring practices.

e) Service employment in area to support mining operation and mine employees (secondary labor market).

9) Social Services and Economics

a) Availability of services; hospital, medical, water, sewer, schools, libraries, police, fire, streets, roads, social services, etc.

b) Community attitudes.

c) Effect on local economy, income levels, land use planning, revenues, and expenditures.

d) Effect on national economy.

10) Health and Safety

a) Fire control.

b) Dust control.

c) Waste and refuse disposal.

d) Restriction to public access.

e) General mine safety.

f) Accident potential and possible control measures.

c. Proposed Reclamation Plan

1) General Description and Statement of Purpose

a) Present land use, present land value.

b) Proposed mining use.

c) Proposed reclaimed land use.

d) Reclamation objectives.

e) Feasibility of successfully meeting reclamation objectives.

2) Reclamation Schedule

a) Scheduled land disturbing activities, topsoil removal, overburden removal and disposal, tailings disposal, pit excavation, surface construction, roads, powerlines, etc.

b) Planned reclamation schedule; grading, topsoil replacement, soil conditioning, cultivating, seeding, pollution monitori pit wall reduction.

3) Reclaimed Land Forms

a) Description and topographic maps showing land form changes and water impoundments with time and the ultimate land form upon completion of mining.

b) Reasons for selecting final land form and land use and alte native land forms and land uses considered (forestry, agric tural, industrial, etc.).

4) Reclamation Techniques

a) Techniques and equipment for topsoil removal, storage, erosion prevention, replacement and stabilization.

b) Techniques and equipment for land form shaping, erosion prevention, and stabilization.

c) Techniques and equipment for topsoil replacement, soil conditioning (mulching, fertilization, discing, harrowing, etc.).

d) Planting schedules, seed mixture, rationale for seed mixture selection, alternate plant species, effect of climatic conditions.

e) Planned supplemental watering practices and irrigation.

f) Water impoundment locations, introduction of aquatic species, water quality monitoring.

5) Consultants' reports and any other published or unpublished supporting data may be included in the appendices.

a) Results of reclamation research in establishing planned reclamation objectives, climatology, soils survey and analysis, plant species responses, animal population responses, grading and soil manipulation effectiveness, leachate column tests, accelerated weathering tests, etc.

b) Continuing program of research and monitoring to determine success of proposed techniques and practices and to develop new or improved reclamation practices.

B. Upon receipt by the approving official of a proposed plan, a on-site inspection will be made. The offical will contact the applicant, the appropriate Federal or State surface management agency and any other Federal, State and local public offices known to have a specific interest in the area and will arrange for a joint inspection of the proposed project site. An EA, which should include and evaluate the following information, should then be prepared according to outline in Part A, III.C.

1. Exact location of planned project (section, township, range, county, state).
2. Company operator's name.
3. If plan involves more than one lease, state initially and indicate scope. Identify leases.
4. Resource development history of the area.
5. Brief but precise description of topography, soils, and geology (include extent, lithologies, significant physical characteristics and appropriate thicknesses).

6. Describe overburden, thickness, composition, estimated removal volume, stability when disturbed.

7. Indicate resource and grade or quality (nonpropriety general information should include significant characteristics such as trace elements, water content).

8. Describe any potential geologic hazards and procedures to minimize them.

9. Detail scope of planned action.

10. Anticipated schedule of starting date and duration of project.

11. Quantity and size of equipment.

12. Roads - length, right-of-way, surface, permanent/temporary.

C. The Approving Official will:

1. Provide a fact sheet to the Regioanl staff as soon as a decision is made to prepare an EA. (Attachment 2-M).

2. Notify the appropriate Area or District Geologist regarding the proposed action and utilize the geologic review provided, including consideration of any potential geologic hazards relating to the proposal.

3. Complete the matrix shown in Attachment 1-M. This will assure that all the various factors that may have an impact on the environment are taken into consideration prior to the decision-making process.

4. Consult the appropriate Conservation Division Area or District Geologist, District Water Resource Division Personnel, Geologic Division personnel as well as appropriate State agencies on questions concerning water resources, geology, and geophysical data.

5. Contact each Management agency having administrative supervision over the area of proposal and solicit their expert advice. (Including inter- and intra- departmental agencies as well as appropriate State agencies).

6. Maintain a log of names, dates, organizations, data received, etc., for review and future reference.

7. Use the following outline in preparing the EA:

   a. Title

   b. Date

   c. Table of Contents

   d. Background and Description of the Proposal

      1) Resource development history
      2) Description of plan

   e. Location and Natural Environment

      1) Geographic location

      2) Geology and hydrology of the general area

      3) Meteorology

      4) Biology - flora and fauna of area

      5) Social characteristics

         a) Current and anticipated Land-use

         b) Cultural resources such as:

            1) Archeology

            2) Historical sites

f. Environmental Aspect of Mining

1) Surface

2) Air

3) Water

4) Noise

5) Biology

6) Social Description

a) Economic

b) Degree of public interest

c) Historical, archeological, and cultural

g. Alternatives to the Proposed Action (include proposed accommodations of adverse effects)

h. Adverse environmental effects which cannot be avoided.

i. Conclusions

j. Determination

1) I recommend that the proposal (does) (does not) constitute a "major Federal action" significantly affecting the quality of the human environment in the sense of NEPA, Section 102 (2)(C).

Signature and title of approving official

Date

2) I determine that the proposal (does) (does not) constitute a "major Federal action" significantly affecting the quality of the human environment in the sense of NEPA, Section 102 (2)(C). Signature and title of official in next higher supervisory office.

Date

k. Matrix analysis (Attachment 1-M).

l. Appendices - should include relevant reports (e.g. geologic, hydrologic), maps, copy of proposal, logs and responses to Conservation Division information requests, etc.

8. Recommend to the supervisory official whether the proposed plan is a "major Federal action."

9. The supervisor will determine after considering the preparing officials' recommendation, whether or not the proposal is a "major Federal action."

   a. If the supervisor disagrees with the recommendation, a copy of the EA, and reasons for disagreement will be sent to the next higher supervisory level for a determination.

   b. The determining official will send a copy of the completed EA to the next higher supervisory level for review and comment so that the quality of analyses can be evaluated.

   c. Should the determination be made that a proposed action <u>does</u> constitute a "major Federal action", the documentation is to be forwarded through Chief, Conservation Division, to the Environmental Section in order that the Geological Survey may make arrangements for EIS preparation.

IV. Environmental Impact Statement

A. Procedure - refer to existing Part 516 DM 2, Department of the Interior Manual, September, 1971.

B. Assignment of EIS Task Force members - EIS preparation requires the assignment of Conservation Divison personnel of various disciplines to serve either full or part time membership. Upon Director's office request to the Division, the Assistant Division Chief, Programs, will request that the Assistant Division Chief for the appropriate headquarters element, the action Branch, will contact the Conservation Manager of the action region to designate membership for the term of the Impact Statement preparation. This information is to be sent to the headquarters Environmental Section for transmittal to the Assistant Director, Environmental Conservation.

No Impact

Minor Impact

Major Impact

EXISTING CONDITIONS

	PROPOSED ACTION	LAND USE										PHYSICAL CHARACTERISTICS										SOCIAL CHARACTERISTICS								
		Forestry	Grazing	Wilderness	Agriculture	Residential-Industrial	Mineral Extraction	Oil and Gas	Recreation, Parks or Reserves	Scenic views or unique physical features	Monuments or Historic Sites	Birds	Land Animals	Fish	Endangered Species	Flora	Surface Water	Ground Water	Air Quality	Erosion	Other	Effect on Local Economy	Safety and Health	Others						
Construction	Roads, bridges, airports																													
	Transmission lines, pipelines																													
	Dams and impoundments																													
	Others (pump stations, compression stations, etc.)																													
Pollution	Burning, noise, junk disposal																													
	Liquid effluent discharge																													
	Subsurface disposal																													
	Others (toxic gases, noxious gas, etc.)																													
Drilling Production	Well drilling																													
	Fluid removal (Prod. wells, facilities)																													
	Secondary recovery																													
	Noise or obstruction of scenic views																													
	Mineral processing (ext. fac.)																													
	Others																													
Transport. Oper.	Trucks																													
	Pipelines																													
	Others																													
Accidents	Spills and leaks																													
	Operational failure																													
Other																														

(INSTRUCTIONS. This matrix serves to summarize the environmental impacts of the proposal considered in the Environmental Analysis. Each matrix should indicate what proposal is being considered. The appropriate boxes should be marked as indicated for major and minor impacts; ⧄ Minor; ☒ Major; blank boxes signify no impact.

Please note that this does not evaluate whether an impact is positive or negative. The Geological Survey's nonadvocacy role must be maintained in the matrix analysis.

In considering each potential environment impact, one must consider not only the effect of exploration but of possible production. In [illegible]sence, the object is to determine if development and exploitation of mineral resources is in [illegible]cord with a multiple-use concept.)

PART B

Projects associated with

Onshore Oil,

Gas and

Geothermal Proposals.

CONTENTS

Part B

Part B - Projects associated with onshore oil, gas and geothermal proposals.

I. Definitions

A. Applicant. A lessee or permittee or one conducting operations on the leased or permit lands under the authority of the lessee or permittee.

B. Approving Official. The official who normally approves an action and has the responsibility for preparing the environmental analysis. The approving official is usually the appropriate District Engineer or District Supervisor but it may be the Area supervisor.

verify C. Development well.

D. Exploratory Well is a well drilled two miles or more from an existing known geologic structure or known geothermal resource area or if not established, two miles or more from an existing producible well.

E. Federal Office shall mean the office of any Federal agency which may have a responsible interest in the area of the proposed drillsite.

F. Local Public Office shall mean the office of any country, borough, parish, or municipality which may have an interest in the area of the proposed drillsite (e.g., city or County Zoning Commission, Park Commission, Environmental Council, Water Commission).

G. State Office shall mean the office of any State agency which may have an interest in the area of the proposed drillsite (e.g., State Mineral Resources Division, Oil and Gas Commission, State Engineer, State Game and Fish, State Environmental Council).

II. Responsibility.

The guidelines and procedures herein set for are to be implemented immediately.

Approval of proposed plans will not be granted prior to environmental analysis determination.

These instructions are applicable in all instances where proposed resource evaluation, exploration plans, new mining plans or major changes in existing approved mining plans require approval.

These instructions will apply to all Federal and Indian leases and permits whether or not the surface is owned by the United States.

The approving official has the responsibility:

For assessing the environmental impact of a proposed program;

For obtaining and evaluation input from other Federal, State, and local public offices;

And for recommending whether the approval of the proposed operation will constitute a "major Federal action significantly affecting the quality of the human environment".

In assessing the overall impact of an exploration program on the environment, the approving official must assume that each venture may culminate in a producing operation.

A. EA preparation is indicated for the following types of proposals.

1. Exploratory wells

2. Development programs, including auxilliary facilities (e.g. roads, tank batteries, gathering lines, impoundments, etc.)

3. Special cases, including but not limited to:

   a. Utilization of recovery techniques new to affected area.

   b. Utilization of new technology.

   c. Disposal and injection wells.

   d. Politically sensitive areas.

   e. Others -(reviewers please identify)

B. EA preparation is not necessary when the proposal is part of a larger program which has already been approved. A memorandum describing the current proposed action with appropriate EA references is to be submitted for Conservation Division and Regioanl Files. A copy should also be provided for the Environmental Section.

III. Procedures

A. In order to assure that a proposed action is developed within an approvable framework, the applicant should supply the following information:

1. For exploratory and development plans

a. Exact location of planned project (sections, township, range, county, state).

b. Company operator's name.

c. Commodity being sought.

d. If plan involves more than one lease, state initially and indicate scope. Identify leases.

e. Brief but precise description of topography, soils, geology (include extent, lithologies, significant physical characteristics and appropriate thicknesses) and any potential geologically-related hazards (e.g. subsidence).

f. Describe reservoir or anticipated producing horizons.

g. Detail scope of planned action, including

(1) Mud program

(2) Casing program

(3) Programs necessary to accommodate potential hazards such as H_2S, Blowouts, etc.

h. Describe auxilliary facilities.

i. Anticipated schedule of starting date and duration of project.

j. Quantity and size of equipment.

k. Resource development history of area.

l. Roads - length, right-of-way, surface, permanent/temporary.

m. Completed 12 point program or programs required under Geothermal Regulations.

n. Archeological, historical, and cultural values.

B. Upon receipt by the approving official of a proposed plan, an onsite inspection will be made. The official will contact the applicant, the appropriate Federal or State surface management agency and any other Federal, State and local public offices known to have a specific interest in the area and will arrange for a joint inspection of the proposed project site. An EA, which should include and evaluate the following information, should then be prepared, according to outline on Part B, III. C. 7.

1. Exact locaton of planned project (sections, township, range, county, state).

2. Company operator's name.

3. If plan involves more than one lease, state initially and indicate scope, Identify leases.

4. Resource development history of the area.

5. Brief but precise description of topography, soils, and geology (include extent, lithologies, significant physical characteristics and appropriate thichknesses).

6. Describe nonproprietary subsurface conditions, and resource composition.

7. Describe any potential geologic hazards and procedures to minimize them.

8. Detail scope of planned action.

9. Anticipated schedule of starting date and duration of project.

10. Quantity and size of equipment.

11. Roads - length, right-of-way, surface, permanent/temporary.

C. The approving official will

1. Prepare a Fact Sheet for the Regional staff as soon as the decision is made to prepare an environmental analysis. (Attachment 2-OG).

2. Notify the appropriate Area or District Geologist regarding the proposed action and utilize the geologic review provided, including consideration of any potential geologic hazards relating to the proposal.

3. Complete the matrix shown in Attachment 1-OG. This will assure that all the various factors that may have an impact on the environment are taken into consideration prior to the decision-making process.

4. Consult the appropriate Conservation Division Area or District Geologist, District Water Resource Division Personnel, Geologic Division personnel as well as appropriate State agencies on questions concerning water resources, geology, and geophysical data.

5. Contact each Management agency having administrative supervision over the area of proposal and solicit their expert advice. (Including inter- and intra departmental agencies as well as appropriate State agencies).

6. Maintain a log of names, dates, organizations, data received, etc., for review and future reference.

7. Use the following outline in preparing the EA:

a. Title

b. Date

c. Table of Contents

d. Background and Description of the Proposal.

1) Resource development history

2) Description of plan

e. Location and Natural Environment

1) Geographic location

2) Geology and hydrology of the general area

3) Meteorology

4) Biology - flora and fauna of area

5) Social characteristics

a) Current and anticipated land-use.

b) Cultural resources such as:

(1) Archeology

(2) Historical sites

f. Environmental Aspect of Proposal

1) Surface

2) Air

3) Water

4) Noise

5) Biology

6) Social description

a) Economic

b) Degree of public interest

c) Historical, archeological and cultural

g. Alternatives to the Proposed Action (include proposed accommodations of adverse effect).

h. Adverse Environmental Effects Which Cannot Be Avoided.

i. Conclusions.

j. Determination

1) I recommend that the proposal (does) (does not) constitute a "major Federal action" significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C).

Signature and title of approving official

Date

2) I determine that the proposal (does) (does not) constitute a "major Federal action" significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C).

Signature and title of official in next higher supervisory office.

Date

k. Matrix analysis (Attachment 1-OG)

l. Appendices - should include relevant reports (e.g. geologic, hyrologic), 12 point program, maps, copy of proposal, logs and responses to Conservation Division information requests, etc

8. Recommend to the supervisory official whether the proposed plan is a "major Federal action".

9. The supervisor will determine after considering the preparing officials recommendation, whether or not the proposal is a "major Federal action".

a. If the supervisor disagrees with the recommendation, a copy of the EA, and reasons for disagreement will be sent to the next higher supervisory level for a determinaiton.

b. The determining official will send a copy of the completed EA to the next higher supervisory level for review and comment so that the quality of analyses can be evaluated.

c. Should the determination be made that a proposed action <u>does</u> constitute a "major Federal action", the documentation is to be forwarded through Chief, Conservation Division, to the Environmental Section in order that the Geological Survey may make arrangements for EIS preparation.

IV. EIS

A. Procedure - refer to existing Part 516, DM 2, DOI Manual, September, 1971.

B. Assignment of EIS TAsk Force members - EIS preparation requires the assignment of Conservation Division personnel of various disciplines to serve either full or part time membership. Upon Director's office request to the Division, the Assistant Division Chief, Programs, will request that the Assistant Division Chief for the appropriate headquarters element, the action Branch, will contact the Conservation Manager of the action Region to designate membership for the term of the Impact Statement preparation. This information is to be sent to the headquarters Environmental Section for transmittal to the AD/EC.

No Impact

Minor Impact

Major Impact

EXISTING CONDITIONS

	PROPOSED ACTION	LAND USE										PHYSICAL CHARACTERISTICS										SOCIAL CHARACTERISTICS								
		Forestry	Grazing	Wilderness	Agriculture	Residential-Industrial	Mineral Extraction	Oil and Gas	Recreation, Parks or Reserves	Scenic views or unique physical features	Monuments or Historic Sites	Birds	Land Animals	Fish	Endangered Species	Flora	Surface Water	Ground Water	Air Quality	Erosion	Other	Effect on Local Economy	Safety and Health	Others						
Construction	Roads, bridges, airports																													
	Transmission lines, pipelines																													
	Dams and impoundments																													
	Others (pump stations, compression stations, etc.)																													
Pollution	Burning, noise, junk disposal																													
	Liquid effluent discharge																													
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Drilling Production	Hall drilling																													
	Fluid removal (Prod. wells, facilit.)																													
	Secondary recovery																													
	Noise or obstruction of scenic views																													
	Mineral processing (ext. fac.)																													
	Others																													
Transport Oper.	Trucks																													
	Pipeline																													
	Others																													
Accidents	Spills and leaks																													
	Operational failure																													
Others																														

(INSTRUCTIONS. This matrix serves to summarize the environmental impacts of the proposal considered in the Environmental Analysis. Each matrix should indicate what proposal is being considered. The appropriate boxes should be marked as indicated for major and minor impacts; ⧄ Minor; ☒ Major; blank boxes signify no impact.
Please note that this does not evaluate whether an impact is positive or negative. The Geological Survey's nonadvocacy role must be maintained in the matrix analysis.
In considering each potential environment impact, one must consider not only the effect of exploration but of possible production. In essence, the object is to determine if development and exploitation of mineral resources is in accord with a multiple-use concept.)

References

1. Memorandum of May 9, 1972 to Oil and Gas Supervisors, from: Chief, Branch of Oil and Gas Operations, subject: Proposed instructions regarding environmental assessment of proposed plans to drill onshore exploratory oil, gas, or geothermal steam wells on public domain and acquired lands.

2. Memorandum of August 30, 1972 (amended November 24, 1972 to include Indian lands) to all Mining Supervisors, from Chief, Branch of Mining Operations, subject: Instructions regarding the environmental analysis of proposed exploratory and mining plans for minerals on public domain and acquired lands.

3. Memorandum of November 1, 1972 to Oil and Gas Supervisors, Alaska Area; Eastern Area; Gulf of Mexico and Pacific Area from Chief, Conservation Division, subject: Procedures for preparing Environmental Analysis for OCS Operations.

4. Memorandum of May 3, 1973 to Regional Managers, from Chief, Conservation Division, subject: Review and determination procedures for Environmental Analyses prepared by field personnel.

Attachment

FACT SHEET

Date:

Commodity:

Geographic Location:

Leases: Numbers

Lessor:

Lessee:

short lease history (should include designated operator where applicable).

Proposed Plan: date submitted

type of plan

acceptability

Time schedule for proposal:

Production:

Surface Ownership:

Other Mineral Resources and Related Development:

Estimated EA completion date:

FACT SHEET

Date:

Commodity:

Geographic Location:

Leases: Numbers

Lessor:

Lessee:

short lease history (should include designated operator where applicable).

Proposed Plan: date submitted

type of plan

acceptability

Time schedule for proposal:

Production:

Surface Ownership:

Other Mineral Resources and Related Development:

Estimated EA completion date:

FACT SHEET

Date:

Commodity:

Geographic Location:

Leases: Numbers

Lessor:

Lessee:

short lease history (should include designated operator where applicable).

Proposed Plan: date submitted

type of plan

acceptability

Time schedule for proposal:

Production:

Surface Ownership:

Other Mineral Resources and Related Development:

Estimated EA completion date:

IN REPLY REFER

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Reston, Virginia 22092

Conservation Division
U.S. GEOLOGICAL SURVEY
Office of the Area Geologist
Menlo Park, California

February 24, 1975

Memorandum

To: All Conservation Division Offices

From: Chief, Conservation Division

Subject: Preparation and processing of technical publications

The Geological Survey takes considerable pride in the quality of its technical publications. In recent years, as the breadth of our mission has been expanded, there has been a growing trend to publish reports dealing not only with geology but with subjects requiring an interdisciplinary approach. We expect to publish an increasing number of reports concerned with engineering, geophysics, regulations, statistics, and economics.

All writings and data in which the Survey has a proprietary interest, and all writings in which the author's title and Survey affiliation will be shown should be submitted, through Division channels, to the Director for approval or clearance by him (or his deputy), prior to release for outside publication (Survey Manual 500.9). After the Director approves a report for publication or other release, no change in or addition to the text or illustrations, except of an editorial nature, may be made unless the proposed change or addition is submitted through Division channels, is suitably endorsed, and is formally approved.

Every author and supervisor should have at hand and be familiar with "Suggestions to Authors of the Reports of the United States Geological Survey" (STA). This excellent guide describes the current series of Survey publications and the steps to be taken by the author in planning and writing a report. STA also describes the form and content of reports and offers suggestions as to expression.

The recently established Evaluation Standards and Publications (ESP) Section in Denver will provide basic staff services for final Division review of reports and publications. Review by the Chief, ESP Section, for content and format will constitute final Division clearance prior to approval by the Division Chief and transmittal to the Director.

The ESP Section will provide basic editorial services for those regions that do not have a publications staff man or editorial unit, in addition to providing Division clearance prior to approval by the Division Chief. Communications with the ESP Section should be addressed as follows:

Evaluation Standards & Publications Section
Conservation Division
U.S. Geological Survey
Drawer 3586, Federal Building
Denver, Colorado 80202
(Telephone: 303 437-4751)

Regional Conservation Managers may establish staff positions or editorial units to act for them to provide basic editorial services and furnish advice to Area Supervisors and authors in their regions on all matters relating to publications when the workload warrants such action. The Central Region has established an editorial unit in view of their continuing publication workload. Contact with that office can be made to the Staff Geologist for Publications, Central Region, at the following address:

Conservation Division
U.S. Geological Survey
Room 1225, Building 25
Denver Federal Center
Lakewood, Colorado 80225
(Telephone: 303 234-2697)

The attached instructions define the responsibilities of the author, supervisor, technical reviewers, Regional Conservation Manager, and the ESP Section, and give procedures to follow in processing Conservation Division reports.

Chief, Conservation Division

Enclosure:
Responsibilities and Procedures for
Processing Conservation Division
Reports

RESPONSIBILITIES AND PROCEDURES FOR PROCESSING CONSERVATION DIVISION REPORTS

February 1975

Contents

Attachments

RESPONSIBILITIES AND PROCEDURES FOR PROCESSING CONSERVATION DIVISION REPORTS

A. RESPONSIBILITIES

1. *Author*

a. Follows the format for publication series chosen in consultation with the supervisor, using "Suggestions to Authors of the Geological Survey" (STA) for Survey reports, and the appropriate guide provided for outside publications.

b. Consults with supervisor as needed on questions relating to policy or the preparation of book reports, base maps, tables, use of geologic names, and other matters. *Authors are urged to consult with their regional staff personnel when difficulties arise with any phase of report writing or illustration preparation.*

c. Consults with the nearest office (Menlo Park, Calif.; Denver, Colo.; and Washington, D.C.) of the Geologic Names Committee (GNC) regarding problems of name and age designation that may arise in preparation of reports and for a pre-edit of map explanations if specific problems exist. *Instructions from GNC must be strictly followed unless additional discussion leads the committee to modify its instructions.*

d. Prepares illustration originals insofar as practical on stable-base materials using proper line weights and latest drafting and compilation techniques. To reduce costs, author's copy will be used for publication where possible.

e. Transmits the report to supervisor, with the following attachments:

(1) Transmittal memorandum with a statement of the purpose and scope of report. This statement is useful to the technical reviewers.

(2) Completed "Manuscript Review and Approval Sheet" (MR&A, Attachment 1).

(3) Completed Form 9-1517, "Check Sheet for Illustrations and Maps/Photographs (Attachment 2) with each illustration.

(4) Note for listing in "New Publications of the Geological Survey" for all reports to be published in a formal series of the Geological Survey (STA, p. 4 and 5; Attachment 3).

(5) Abstract (Attachment 4).

(6) List of key words, if required (presently required by National Technical Information Service (NTIS), GSA, and some other outside publications).

(7) Line guide, if necessary for clarity.

(8) Press release for open-file reports, <u>only if warranted</u>.

f. Consults with supervisor regarding technical reviewers.

g. Revises report in light of critics comments, leaving no unanswered questions (STA, p. 12).

h. Carefully checks proofs of illustrations and maps after drafting. Checks edited text for final corrections and editorial changes.

2. *Technical Reviewers* (STA, p. 11 and 12)

The technical reviewer or critic is concerned primarily with:

a. Adequate organization and scope of the report.

b. Adequate presentation of the scientific evidence and soundness of the conclusions.

c. Consistency of the maps or other illustrations with written material in the text.

3. *Supervisor*

a. Consults with the author on need for report, priorities, report series, and anticipated date of transmittal to Regional Conservation Manager. Assures that author is

familiar with policy and procedures relating to reports, base maps, preparation of illustrations, use of geologic names, and similar matters.

b. Assures accuracy of work, uniformity, and conformity with Survey standards.

c. In consultation with the author, arranges for a written technical review of the manuscript by at least two critics within the Division. Arranges through official channels for technical reviews outside the Division, when appropriate.

d. Assures that author has satisfactorily revised report following technical review, and that all requirements of the Division Checklist for Supervisors (Attachment 5) have been met. *All reviewers' comments must be submitted with the report..*

e. Assures that clearance has been obtained for use of all confidential information and that necessary acknowledgments and a statement of cooperation are included.

4. *Regional Conservation Manager*

a. Assures responsibilities of the author and supervisor, as outlined above, have been met.

b. Reports on regional publications activities to the Evaluation Standards and Publications (ESP) Section monthly.

c. When the Regional Conservation Manager has established an editorial unit, the unit will provide the following basic editorial services.:

(1) Pre-edit of manuscript for style, format, and general content, to assure conformity with intended publication series, before the report is submitted to technical reviewers.

(2) Basic editorial review following technical review and author's revisions, giving careful attention to arrangement, expression, clarity, and conformance to good Survey practice and standards.

(3) Formal clearance with the field office of Geologic Names Committee and/or Paleontology and Stratigraphy (P&S), if needed.

(4) Indication of additional clearance needed at Division Headquarters from other Divisions or Bureaus.

d. Transmits report to ESP Section for final Division clearance prior to approval by Division Chief and transmittal to Director.

5. *Evaluation Standards and Publications Section*

a. When the Regional Conservation Manager has not elected to establish an editorial unit or does not have staff personnel to provide basic editorial services, the ESP Section will perform the services outlined in parts A.4.c.(1) through A.4.c.(4).

b. Provides for final review and clearance of all reports and transmits same to the Division Chief for approval.

c. Maintains records and a control system for all materials being processed for publication.

d. Acts as primary Division liaison with the Publications Division. The section is responsible for routing proof material after author has completed his review, in order to evaluate the necessity for requested changes and the thoroughness of the review.

e. Reports on publications activities to the Division Chief monthly.

f. Provides budgetary planning for publication needs of the Division.

B. PROCEDURES

1. *For regions without staff personnel or an editorial unit to provide basic editorial services:*

a. Author submits completed report to the ESP Section, through the supervisor and Regional Conservation Manager, for assignment of serial number and a pre-edit.

b. ESP Section returns the report to the supervisor for transmittal to at least two technical reviewers.

c. Following technical review, supervisor returns report to author for consideration of reviewers' comments and any necessary revision.

d. Author submits final report to supervisor for approval and transmittal to ESP Section for editorial review and clearance through GNC and P&S, if needed.

e. ESP Section returns report to author for any necessary final revision and typing on manuscript paper (Form 9-1267, Attachment 6).

f. Author submits two copies of report, with appropriate attachments, to Regional Manager for approval and transmittal to ESP Section. Attachment 7, "Manuscript Checklist for Authors," is included as a suggested aid to authors in checking their reports before transmittal to the supervisor.

g. ESP Section clears report and transmits all materials, including two copies of report, reviewers' comments, MR&A sheet, "Check Sheet for Illustrations and Maps," transmittal memorandum to Publications Division (for open-file reports only, Attachment 8), and "Conservation Division Checklist for Supervisors" to the Division Chief for approval.

h. Upon receipt of the report at Division Headquarters, the Staff Assistant in the office of the Assistant Division Chief for Evaluation will clear the report with GNC and P&S, if needed, and will obtain Division and Director approval for publication.

Approved reports will be processed as follows:

(1) Formal Survey publications: Chief, Conservation Division, will transmit report to Publications Division, with a copy of the transmittal to the ESP Section.

(2) Open-file reports: Transmittal memorandum to Publications Division, with date of Director's approval, will be submitted to Publications Division for assignment of report number. Division Headquarters will then notify ESP Section of any changes or corrections, release date, and report number. The ESP Section will release the report.

(3) Outside publication: Approved report will be returned to the author for release according to instructions for the particular publication.

B.1.h. PROCEDURES-- *Regions without editorial unit*--Continued

(4) NTIS: Division Headquarters will submit approved report to NTIS. NTIS will assign a NTIS Accession Number which is sent to the author for his records.

i. Following Director's approval and the disposal of the report to one of the various media described above, the MR&A sheet and technical reviews will be returned to the ESP Section.

j. During the publication process, the ESP Section will act as Division liaison with the Publications Division in resolving problems that may arise and in routing proof copy for review.

2. *For regions with staff personnel or an editorial unit to provide basic editorial services:*

a. Functions assigned to the ESP Section in parts B.1.a through B.1.e and B.1.h.(2) above are herein assigned to the Regional Conservation Managers.

b. The ESP Section will perform for *all* regions the functions assigned to it in parts B.1.f, g, and j, above.

c. With the exception noted in B.2.a above, all approved reports will be processed as outlined in B.1.h.

1977
USGS
CONSERVATION DIVISION

MANUSCRIPT REVIEW AND APPROVAL (M R& A) SHEET

MANUSCRIPT SERIAL NO.

AUTHOR (S) (Give names as they will appear in publication)

PAGES (including tables) _____

NUMBERED TABLES _____

TITLE (For chapter, give both chapter and volume titles)

TOTAL ILLUSTRATIONS _____

_____ Colored maps, plates

_____ B/W maps, plates

_____ Text figures

_____ Photographs

FORM OF PUBLICATION (Specify series, journal, meeting or similar detail)

PUBLISHER'S DEADLINE

Does this report supersede any open-file report?

No _____ Yes _____

ENTER NEXT ROUTING HERE	DATE IN	DATE OUT	CHECK PROCESSING STEP WITH "X"											SIGNATURE
			REGION							DIV. HDQTRS.				
			Author	Area Supervisor	Technical Reviewer	Regional Manager	Geologic Names Committee	Paleo. & Stratig. Branch		ESP	Assistant Div.Chief	Division Chief	Director	

CONTINUE ON ADDITIONAL FORMS IF NECESSARY

ATTACHMENT 2

FORM 9-1517
(REV. APRIL 64)

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CHECK SHEET FOR ILLUSTRATIONS AND MAPS

This form to be completed by author and attached to manuscript copy of each drafted illustration for Geological Survey publication before report is submitted to supervisor.

DIVISION _____ BRANCH _____ SERIAL NO. _____

AUTHOR

BRIEF TITLE OF REPORT

ILLUSTRATION NO. AND BRIEF TITLE

FORM OF PUBLICATION (Circle one)
Book series: Prof. Paper Bulletin Water Supply Paper Circular Outside
Map series: GQ MF MR HI HA GP OM, OC C

Scale or image size of attached print _____

Scale or image size of original compilation _____
(Original should be at 1:1 or, at most, 25% larger than publication scale)

Recommended publication scale or image size _____

Recommended publication colors
BASE: Multicolor *(culture-land net, drainage, topo)* ☐ Gray road fill ☐ Red road fill and land net ☐
Topo base composite ☐: Screen ☐ Black ☐ Brown ☐ Blue ☐ Other _____
Planimetric base composite ☐. Screen ☐ Black ☐ Blue ☐ Other _____
DATA: Black and white ☐ Black and one other color ☐ Multicolor ☐

Use colors on attached colored-out copy ☐ Match adjacent published or approved map ☐ Reference: _____

Indicate map units to be emphasized and colors preferred for these units _____

Original illustration compiled on
Plastic ☐ Scribe ☐ Metal mount ☐ Cloth ☐ Paper ☐ Other _____
Original illustration in _____ pieces
Original illustration held by _____
Location _____

Has this illustration or map been published previously? _____ If so, give complete reference _____

If published in copyrighted book or journal has permission to publish been received? ☐

Will this illustration or map be used in a later publication in same or modified form? _____

If modified, indicate type of publication, scale, and color requirements _____

Do you have reproducible base material? _____ Scale _____
Color separated ☐ Composite ☐ Positive ☐ Negative ☐
Where base map material is available from other sources? _____

Base map material in Publications Division: MRB ☐; BTI in Wash. ☐ Denver ☐
Menlo Park ☐ Kentucky ☐

Image size, in inches, of illustrations in book publications

Bulletin and Water Supply Paper
4-3/8 by 6½ *(bottom title)*
4 by 7 *(side title)*

Professional Paper
3-3/8 by 8½ *(column width, bottom title)*
7 by 8½ *(bottom title)*
3 by 9 *(column width, side title)*
6½ by 9 *(side title)*

Circular
3-3/16 by 8½ *(column width, bottom title)*
6-9/16 by 8½ *(bottom title)*
2½ by 8½ *(column width, side title)*
6-3/16 by 8½ *(side title)*

Recommended publication scales for maps

1:500 000
1:250 000
1:125 000
1: 63 360 *(Alaska)*
1: 62 500
1: 24 000
1: 20 000 *(Puerto Rico)*

To be checked before report is submitted to Division for Director's approval:

All changes to colored-out copy or other mill copy have been made to original ☐

FORM 9-1517
(REV. APRIL 64)

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CHECK SHEET FOR PHOTOGRAPHS

This form to be completed by author and attached to print of each photograph for Geological Survey publication before report is submitted to Supervisor.

DI ON BRANCH SERIAL NO.

AUTHOR(S)

BRIEF TITLE OF REPORT

ILLUSTRATION NO. AND BRIEF TITLE

FORM OF PUBLICATION (Circle one) Book series: Prof. Paper Bulletin Water Supply Paper Circular Other Outside

Publication recommendations

Image size _____
(Whenever possible submit glossy print at publication scale or indicate by crop lines to bring to publication scale)

Black and white: 150-SCREEN ☐ (normal reproduction) 300-SCREEN ☐ (For fossil plates and where fine detail essential. Show areas of essential detail by translucent overlay)

Color ☐ (Justify in separate memorandum)

Placement in text

Photo to be compared with figs. _____ Same page ☐ Facing page ☐

Combination with other illustrations: Line drawings, figs. _____

Other photos., figs. _____

Scale

Shown by object in photo ☐ Shown by scale on border of print ☐ (Do not place on image)

Cropping and emphasis

Suggested crop lines on edge of print ☐ on translucent overlay ☐

Are symbols and contacts to be added? _____ (Use registered overlay to show placement)

Source of photograph

By author ☐ By another with permission for publication and proper credit line ☐

Copyrighted but with written permission of copyright owner ☐

Negative

Available ☐ Unavailable ☐ Size _____

Negative held by _____

Location _____

Cautions on photographs

Do not mount with glue, tape, or other permanent attaching materials.
Do not attach with paper clips.

Do not place scotch tape over image area.
Do not write directly on final photograph; use overlay to show labeling and linework. Do not write on backs of photographs.
Do not indent image surface with ball-point pen or pencil when marking overlay.

Remember to register all overlays by corner ticks or other marks; indicate top if not obvious.

Note:

Negatives of all photographs published in Geological Survey reports are sent by Branch of Technical Illustrations to the Photo Library, Denver, Colorado.

Image size, in inches, of photographs in book publications

Bulletin and Water Supply Paper
4-3/8 by 6⅝ (bottom title)
4 by 7 (side title)

Professional Paper
3⅛ by 8⅝ (column width, bottom title)
7 by 8⅝ (bottom title)
3 by 9 (column width, side title)
6⅛ by 9 (side title)

Circular
3-3/16 by 8⅝ (column width, bottom title)
6-9/16 by 8⅝ (bottom title)
2⅝ by 8⅝ (column width, side title)
6-3/16 by 8⅝ (side title)

Note for "New Publications of the Geological Survey"

Professional Paper_____

Plant spores and other microfossils from Upper Devonian and Lower Mississippian rocks of Ohio, by M. R. Winslow. 19__. ____ p. $ _____ . (Contributions to stratigraphy)

About 80 species of microfossils have been described and illustrated from beds usually regarded as sparsely fossiliferous. About 130 horizons from 10 localities in northern and central Ohio were sampled from outcrops, cores, and well cuttings to establish the basic pattern of distribution for land plant spores and sporelike marine microfossils in Upper Devonian and Lower Mississippian Formations. Thirty-five species that are most abundant and characteristic have been named specifically; four new genera are represented.

Notes, generally limited to about 75 words and typed in the above format, should be prepared for all book reports, circulars, and maps accompanied by text that are to be advertised in the "New Publications of the Geological Survey" monthly list. The original and three copies, double spaced, should accompany the manuscript when it is sent for Director's approval.

ANCIENT LAVAS IN SHENANDOAH NATIONAL PARK

NEAR LURAY, VIRGINIA

By John C. Reed, Jr.

Abstract

Abstracts are required for all Survey papers except those in the map series. An abstract should start on the first page of text and should be typed in the sequence and format shown above.

In typing abstracts for publication by organizations other than the Geological Survey or for papers to be presented at meetings of scientific organizations, the same general rules are followed that are followed for Survey manuscripts. For example, do not break paragraphs at the end of the page, double space everything, and allow adequate margins (two inches at top of this page). Avoid dividing words at the end of a line if possible because the printer might set the divided words as hyphened words even though they did not fall at the end of the printed line.

Some technical societies have their own printed abstract forms that must be used for typing the manuscript, but this form <u>should not</u> be used until the abstract has received Division and Director approval.

_____ Brief title of report

_____ Division Serial No.

_____ Author

CONSERVATION DIVISION CHECKLIST FOR SUPERVISORS

_____1. The report meets all requirements of a well-prepared manuscript, as set forth in STA, p. 18-20.

_____2. The report has received adequate technical review (at least two reviews) and the author has considered all review comments. Suggested changes have been made or the author has reached agreement with the reviewers on all questions.

_____3. The revised report has been typed in accordance with the practices specified in "Suggestions to Authors of the United States Geological Survey" (STA) on pages 218-220. Manuscript paper (Form 9-1267, sample attached) has been used.

_____4. For illustrations that include linework that is difficult to follow (i.e., if faults or contacts, or the dashing of linework are not clearly differentiated, or special cartographic problems exist), a "Line Guide" has been prepared on which the linework is indicated by various colored pencils and a color key is included.

_____5. The text and/or illustrations are clean and legible.

_____6. The transmittal letter to the Regional Manager states the recommended form of publication. (At this time the supervisor should make a statement of any unusual conditions and any additional clearance required or additional technical review necessary outside the Division.

_____7. A press release is enclosed if warranted by the timeliness of the report.

_____8. Two copies of the report (the original typed text plus one carbon or other copy) are enclosed, with the following attachments:

_____ (a) Two prints of all illustrations. Colored prints are submitted of all illustrations that are to be differentiated by pattern or color.

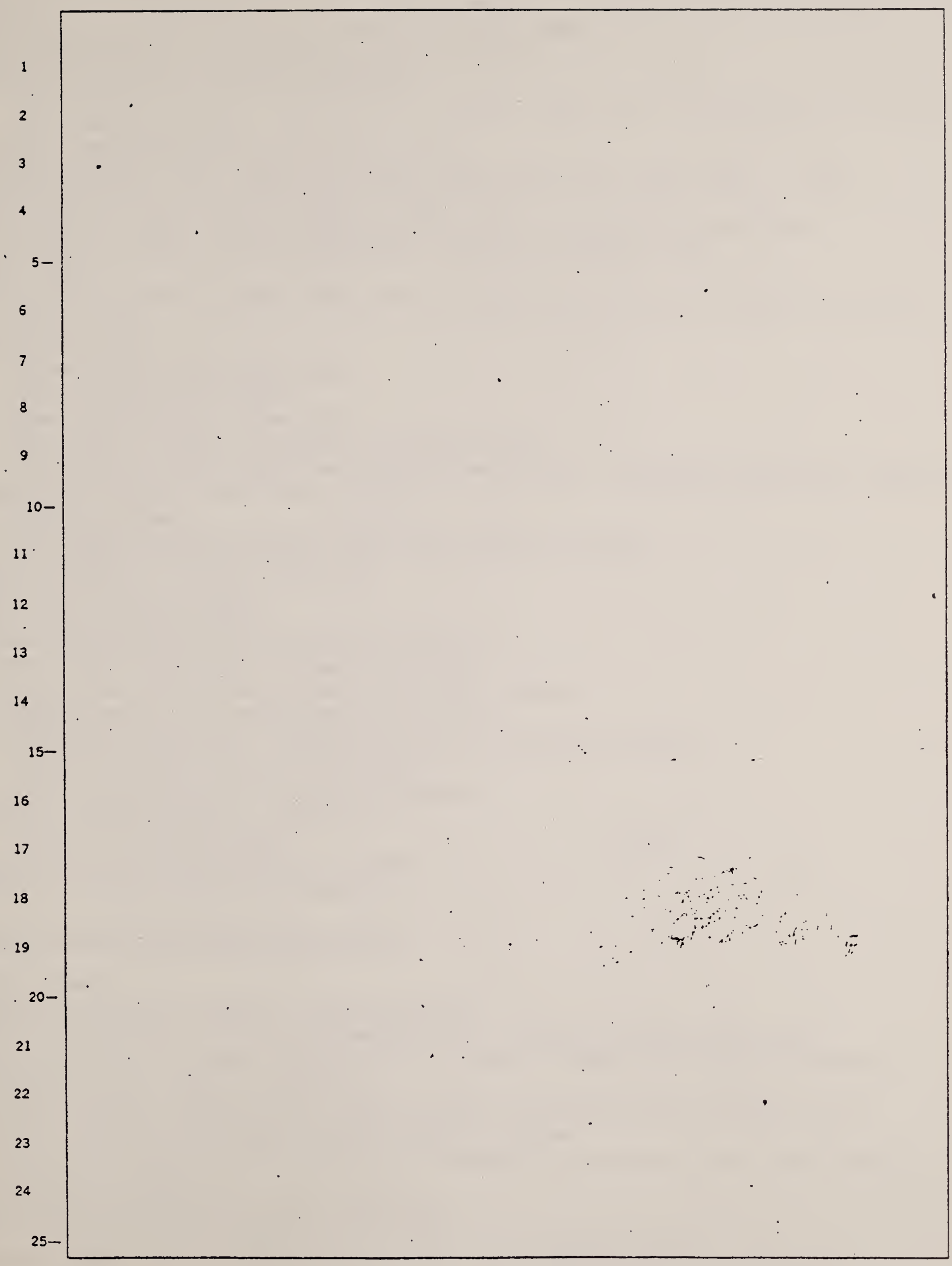
_____ (b) "Check List for Illustrations and Maps/Photographs" (Form 9-1517, Attachment 2) is included with each illustration.

_____ (c) All technical review comments and pertinent correspondence.

_____ (d) Note for listing in "New Publications of the Geological Survey" for all reports to be published in a formal Survey series. Example attached.

_____ (e) "Manuscript Review and Approval Sheet" (Rev. 12/74, Attachment 1) which has been signed by the author, supervisor, and all technical reviewers.

_____
Supervisor's signature



☆ U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171

MANUSCRIPT CHECKLIST FOR AUTHORS

Title of report _____ Date _____

_____ Report typed according to STA, "Requirements of well-prepared manuscript" p. 18-26
_____ Abstract. Title and author appear at top of page.
_____ Acknowledgments: No over-use (STA, p. 28).
_____ Contents checked with text headings.
_____ Center heads agree (no more than 5 ranks); side heads do not appear in Contents
_____ Page numbers agree.
_____ Credit for analytical work (STA, p. 28).
_____ Communications, oral and/or written, show author and date (STA, p. 105).
_____ References properly cited (STA, p. 105-122).
_____ Cooperative work acknowledged on title page and pocket illustrations.
_____ Footnotes checked; listed according to STA, p. 106 and 217.
_____ GNC check
_____ Geographic names checked; place names appear on map or are located in respect to map area.
_____ Illustrations
_____ Titles agree with text entry.
_____ Numbers agree with text.
_____ Show what text says they show.
_____ Extra copy of list attached to illustrations.
_____ Illustrations title page is inserted immediately following principal reference.
_____ Measured sections have been edited.
_____ Totals checked.
_____ Lithology thickness agrees with map columnar section.
_____ Page numbers in correct sequence.
_____ Paragraphing is correct.
_____ P&S check, if necessary.
_____ Quotations checked with source for accuracy.
_____ Reviewers' questions have been resolved.
_____ Tables: list with title, number, and page number.
_____ Numbers and page numbers agree with text.
_____ Reference inserted at point of first principal reference.
_____ Accepted format (STA, p. 206-218).
_____ Credit to analysts (usually in headnote).
_____ Tabular material totals checked.
_____ Typed on separate pages.
_____ Descriptive statement on title page.
_____ Credit for copyrighted photographs.

ATTACHMENTS TO BE TRANSMITTED WITH REPORT

_____ MR&A sheet
_____ Technical review comments, correspondence
_____ Note for Monthly List of Publications (for formal Survey series only)
_____ Press release for open file (only if warranted because of special interest)
_____ Original plus 1 copy of report
_____ Check List for Illustrations (Form 9-1517) attached to each figure, with copy of manuscript page listing complete title
_____ Extra copy of list of illustrations (attached to figures, which are assembled at back of report)
_____ If photos, extra set in back, unmounted
_____ One-sentence description on title page of book-type reports
_____ List of key words for NTIS publications (and some outside publications)

Report No._____
(P&PM will supply)

Transmittal memorandum

Date_____

To: Branch of Plans and Program Management
Publications Division (Stop 329)

From:

Subject: New USGS Open-File Report

The following report was authorized by _____ for the Director

on _____ for release in the open files:

Title:

Author(s):

Contents: _____p., _____pls., _____figs., _____tables.

Map scale:_____.

Depositories (list and addresses):

Location of depositories holding reproducibles:

Release date:

_____

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

July 12, 1976

Memorandum

To: All Area Supervisors

From: Acting Conservation Manager, Western Region

Subject: Approval of reports for publication

Please note carefully the attached memo from the Acting Division Chief and distribute the memo to all employees who could likely author any kind of report that would require Director's approval. In the future if you have any questions about the need for Directors approval, please contact Steve Tyley well in advance so that further incidents such as this will be prevented.

Robert J. Jaske

Enclosure

United States Department of the Interior

RECEIVED
U.S. Geological Survey
JUL 12 1976

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

JUL - 8 1976

Conservation Division
Western Region
Menlo Park, Calif.

Memorandum

To: Conservation Managers, Eastern Region
Central Region
Western Region
Gulf of Mexico OCS Operations

From: Acting Chief, Conservation Division

Subject: Approval of reports for publication

Recently, three reports authored by Conservation Division personnel were submitted for Director's approval after publication. The Director's Office refused to approve the reports because such practices are in direct violation of long-standing Geological Survey policy. A report authored or coauthored by a Division employee, while he or she is on the U. S. Geological Survey payroll, must receive Director's approval for publication. Such approval must be obtained before publication.

A Division employee who is the senior author of a report has no excuse for not submitting the report through established Survey review procedures. A Division employee who is not the senior author of a report to be published outside the Survey and is coauthored with a non-Survey scientist has the obligation to inform the non-Survey author of the review and approval policies and procedures of the Geological Survey.

It has been the practice of this Division to make every effort to accommodate authors in processing manuscripts and maps in a timely manner in order that publication deadlines can be met. However, it is necessary for authors to cooperate in this processing effort so that unfortunate situations such as that involving ex post facto approval of reports will not occur.

Russell G. Wayland

Acting Chief, Conservation Division

Reference: U.S. Geological Survey Manual 500.9

ATTACHMENT 1

CONSERVATION DIVISION MANUSCRIPT REVIEW AND APPROVAL SHEET (MR & A) Rev. 12/7

TYPE OF PUBLICATION		SERIAL NO.
Symposium Proceedings		W-76-4
AUTHOR(S)	TITLE	NO. OF PAGES 12
Robert B. Sanders	Coal Resources of Alaska Proceedings of Symposium: Focus on Alaska's Coals, College, Alaska 1975	NO. OF ILLUSTRATIONS 1 NO. OF TABLES 0

ENTER NEXT ROUTING HERE	DATE IN	DATE OUT	Author(s)	Area Sup.	Tech. Review	Rec. Mgr.	G.N.C.	R & S.				ESP	Div. Hdqtrs	Div. Chief	Director	SIGN COMPLETION OF STEP OR APPROVAL HERE
AUTHOR(S)		1976 April 22	X													[illegible]
J. E. Callahan	4/22/76	4/22/76			X											[illegible]
R H McMullin	4/23/76	4/23/76		X												[illegible]
Reg. Mgr.	4-26-76	4-26-76				X										[illegible]
ES&P Section	5/03/76	5/04/76										X				[illegible]
Div. Hdqtrs	5/12/76	5/12/76											X			[illegible]
Div. Chief	5/12/76	5/12/76												X		[illegible]
Director																

NOTE: The submission of manuscripts for Director's approval after publication violates both the letter and the spirit of established procedures. Such manuscripts will not receive approval, and any problems brought upon the author because of such action will have to be handled within usual administrative procedures.

Where risk appears and needed delay can be dealt with reality through present procedures.

W P Hunt

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Technical Reports Unit
345 Middlefield Road
Menlo Park, California 94025

Memorandum May 1, 1975

To: All professionals, ~~Geologic Division~~

From: Geologic Map Editors, Technical Reports Unit

Subject: Ordering base map materials

Base map materials are supplied to the operating divisions by the Publications Division. In a recent memo, the Assistant Chief of Publications Division offered some suggestions to people who would like to have base map materials prepared in the proper form and delivered on time.

° Please submit base map requests as early as possible. Past experience has shown that once a request is received it takes from 3 to 8 weeks to supply a base.

° Priority requests should be kept to a minimum, lest they become meaningless.

° Please consult with the Publications Division via TRU during the project planning stage to assure the selection of the proper base map coverage.

° Requests for base maps should be specific (list the necessary features and state whether they should be prepared as separates or combinations).

° Do not order a base unless you plan to use it. (Approximately half the bases prepared by Publications Division never become part of an approved report for publication.)

° Please designate a project or regional name (in addition to the topographic quad name) for the requested base so that the map can be correlated later with the approved report. (This will help us to avoid duplication of already existing base maps.)

° Please use the most recent topographic base when compiling your data (failure to do so will result in a recompilation of data at a later date in order to be current--consult with Publications Division).

° When you request a base map consisting of two or more quadrangles (where feature names may be repeated) please keep your requests for type deletions to a minimum in order to keep time and costs down.

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

December 7, 1976

Memorandum

To: All Geologists, Pacific Area

From: Acting Area Geologist, Pacific Area

Subject: Review of technical reports

Attached are memoranda by Ed Eckel and Steve Tyley on this subject.

Each of you should see that your reports have proper review and that you are ready and willing to service the reports of others.

Vern

E. Vernon Stephens

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

November 17, 1976

Memorandum

To: All Area Supervisors

From: Acting Conservation Manager, Western Region

Subject: Technical review procedures for preparing manuscripts and official documents

If you have not established an effective technical review procedure within your office, you are asked to do so. It is not only important to improve the accuracy of manuscripts and reports but also to increase the communication skills of the Western Region Personnel.

Your procedures should include:

1. The careful and critical review of maps and manuscripts for publication, open-file, or other reports to be used outside of the Division or available to the public should be made by at least two technical people in addition to the author(s). This includes classification minutes, OCS summary reports, and EA's and information prepared for inclusion in EIS's.

2. Land descriptions, acreage calculations, metrication, etc. should be checked for accuracy by a second person.

3. Please assure that the employees have copies of guidelines available to them such as Division formats, "Suggestions to Authors", and the like.

4. It is recommended that final drafting not be done until the reviews have been completed.

Attached is a copy of a statement on technical reviews which was drafted by Ed Eckel and which was provided by Pricilla Patton of the Evaluation Standards and Publications Section. I suggest that you distribute copies to your technical personnel for their information.

These procedures and others that you may find useful will greatly aid in the expeditious review and processing at this office, and should reduce some of the related problems we have shared during the past.

for Hillary A. Oden

Enclosure

March 1976

TECHNICAL REVIEW OF MANUSCRIPTS

Statement drafted by Edwin B. Eckel, geologist,
U.S. Geological Survey, Denver, CO

Aside from the manuscript itself, the technical review is possibly the most important step in the transformation of research results into a published report. The author is too close to his work; a fresh objective look by someone else is essential in order to spot errors in fact or reasoning, inconsistencies, or generally poor organization and presentation that may obscure what the author has tried to say. Even though it represents the best reasoning, exposition, and organization of which the author is capable, every manuscript will benefit from conscientious technical review, preferably by two people--one who is thoroughly familiar with the subject matter, and one who is not, but who can more nearly represent the average reader.

Experience has shown that inadequate reviews invariably lead to problems and delays in the publication process, and to publications that are disappointing to author, publisher, and reader alike. For these and other reasons, technical review is mandatory within the Survey and in most other research organizations.

The critical technical review of the whole paper is distinct from, and commonly precedes, such specialized reviews as those for geologic maps, usages of stratigraphic and geographic names, and the like.

The main attention of the critical reviewer will be focused on the scientific content: Has the author drawn conclusions from insufficient evidence? Has he overlooked alternative hypotheses? Are the facts well documented and correct as stated? Does the paper contain digressions or discussion of controversial hypotheses that might better be excised and published elsewhere? Considering the probable audience for this particular paper, is the emphasis acceptable? Do the facts shown on the illustrations coincide with the descriptions and interpretations of them as given in the text?

The critic will also watch for errors of omission or commission that would reflect on the author or his employer, such as: permission to use, and proper acknowledgment of, borrowed data or ideas (especially "company confidential" material); credit to collaborators; and adequacy of references cited in terms of professional ethics. The author will receive most of the praise or blame for his report, but in this he is not separable from his employer, and anything that reflects on the one also reflects on the other.

Each critic has his own methods for review of a manuscript. Nearly all experienced ones find, however, that they do their best and most helpful reviews by avoiding interruptions and staying with a manuscript until the review is completed. The thoughtful technical review is too important to the author, to the smooth forward progress of the report, and to the ultimate reader to justify anything but the reviewer's undivided attention.

First scan the entire paper quickly to obtain an idea of the general form of the report, of its weak points, and of its message for the audience to whom it is addressed. On a second and more careful reading, of both text and illustrations, note all the items that raise questions or that need further attention. Some critics mark transpositions or write comments directly on the manuscript, but many prefer to identify questionable passages with key numbers and to build up a running list of queries, comments, and, if necessary, suggested rewrites. Mark illustrations lightly, if at all, and use leaders from map features to notes on the margin.

A third reading of manuscript and of tentative comments will result in a final list of clearly expressed suggestions, amended as necessary from the original ones. This step should be followed by writing an overall review of the manuscript. Its good points (which all manuscripts have) should be emphasized, but the bad and questionable qualities must also be stated forthrightly. Sarcasm and wisecracks should be avoided unless the critic knows his author's capacities well. Wisely and kindly used, however, a sarcastic or witty remark may help the author improve his future writing more than would a simple delete-mark.

If the paper requires further review by others, as for a subject on which the critic feels incompetent, the review should so state. In summary, the review should tell the author and his supervisor, in general terms, what they need to know about the relative excellence of the manuscript and what needs to be done to make it even better.

Try as he will, the critic will find it difficult, if not impossible, to separate his review of the technical content from its presentation. The two are necessarily inseparable, for words, phrases, and paragraphs are merely tools for reporting to others the facts and inferences that are in the author's mind. If the tools are dull or ill-chosen the report will not be understood correctly by the reader; if the facts and inferences are hazy or poorly understood, no skills in presentation can hide their weaknesses.

Adequate criticism of a manuscript, then, is inevitably a two-sided problem--examining the soundness of the data, reasoning, and conclusions (technical reviewing); and helping the author to transmit his ideas into the mind of the reader with a minimum of distortion (editing). The critic must use his own best judgment in treading the narrow path between technical review and editing. He should feel free to suggest any changes in organization, expression, or other facets of the presentation that might make the report more understandable and useful to the reader, but both he and the author should stand ready to defer to the editor's later suggestions on these matters.

The critic should rewrite no more than is necessary to test his interpretation of a statement in his own mind; few authors learn much from being spoon-fed, even when the critic's revision results in marked improvement. If the entire paper, or significant parts of it, requires rewriting, the critic should say so. Given specific advice as to his paper's deficiencies, the author should be able to do a better job of revision than can anyone else, and he will learn from the experience.

Authors seldom believe it until they become technical critics themselves, but the fact is that nearly all critics are people of good will, genuinely trying to help the author. Criticism is at best a thankless job, done by people who would much rather pursue original research than review

manuscripts by others. Rarely, the critic may run across a gem of new thought in his own specialty; if he does, he will be grateful for the critical assignment. More often, his job will be a sterile one for him personally, done in the knowledge that his help is as likely as not to upset or antagonize the one he is trying to help.

The author, then, should approach the critic's comments on his manuscript with an open, cool mind. He must realize that every comment deserves his thorough and objective consideration. Some critical comments may seem at first to be so wrong as to imply gross carelessness, if not downright stupidity, on the part of the critic. Such implications are almost certainly wrong. The author must assume that the more "stupid" a critic's comments, the more the original manuscript deserves careful restudy. Surely something in the expression, the facts presented, or the reasoning led the critic astray and caused him to make the "stupid" comment or mark. The critic has read the manuscript more carefully and with more background knowledge than will the ultimate reader; if he missed the author's point, so too will the reader of the published report.

Most differences between author and critic can be resolved by frank discussion, face to face if possible, but in writing if not. Should differences persist, it may be necessary to go to higher authority, to ask for a new review by a disinterested party, or to arrange for a joint study of the original field or laboratory evidence.

Papers by Survey authors that are submitted to outside journals for publication are commonly given an additional round of technical review by the outside organization. The journal editor usually receives many more manuscripts than he can publish, and he must choose those papers that best fit the needs of his particular audience and that fit within the policies and restrictions of his organization. To help him in his decisions, the editor usually seeks the advice of one or more critics who are specialists in the subject matter of a particular manuscript. The author will be well advised to accede gracefully to the journal editor's policies. If his research and conclusions are sound, they will stand up to additional technical review. And if his paper is accepted, it will probably be published promptly and will be seen by the audience most interested in it.

(END)

Note on metrication

According to Bill Hirs (Aug 1977) metrication has not been standardized despite all the memos. Latest ruling on some Idaho phosphate minutes are to write all units in english only with a metric conversion table in the introduction

Peter Lindladen

8-10-77

United States Department of the Interior
U.S. Geological Survey
516 National Center
GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

FEB 22 1977

Conservation Division
Western Region
Menlo Park, Calif.

JAN 21 1977

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RUSSELL
LAZARUS
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PASSAGLIA
FILE

Memorandum

To: Chief, Conservation Division

From: Chief, Topographic Division

Subject: Metrication

You will recall that we asked you about a year ago for advice and comments on our plans to convert the National Mapping Program products to the metric system. At the same time we solicited comments from about 150 State officials, Federal offices, engineers, surveyors, educators, and various associations.

After considering the responses from you and the others we contacted, (70 percent of them responded) and after evaluating the various in-house production problems associated with conversion, we formulated a policy on the conversion process and it has been approved by the Director. A copy of the policy statement is enclosed.

We appreciate the advice furnished by your office and we assure you that we will do all we can to bring about this conversion as smoothly as possible.

for R. H. Lyddan

Enclosure

RECEIVED
FEB 24 1977
Conservation Division
U.S. GEOLOGICAL SURVEY
Office of the Area Geologist
Menlo Park, California

USGS STATEMENT ON THE PREPARATION OF METRIC BASE MAPS

FOR THE NATIONAL MAPPING PROGRAM

In accord with the national intent to convert to the metric system, the Geological Survey will pursue a policy of proceeding with metrication as rapidly as possible, compatible with production goals and objectives and with due consideration for map user needs. All new and completely revised small-scale and intermediate-scale maps will be prepared using the International System of Units (SI). Completely revised standard quadrangle maps formerly prepared in the English system will now be prepared in the metric system. New standard quadrangle maps will be prepared in either one or a combination of the systems for the time being, depending on the unique situation in each State. The objective is to ultimately prepare all products of the National Mapping Program in the metric system.

The map elements to be shown in metric units are contours, elevations and distances, bathymetric contours and soundings, and the Universal Transverse Mercator (UTM) rectangular coordinate reference system:

Map Scales

The scales for maps prepared in the metric system will be 1:25,000, 1:50,000, 1:100,000, 1:250,000, 1:500,000, and 1:1,000,000. The Puerto Rico series will continue to be prepared at 1:20,000 scale.

Contour Intervals

The basic contour intervals for the various map scales will be 1, 2, 5, 10, 20, 50, and 100 meters.

Elevations and Distances

Elevations will be shown in meters. Distances will be shown in kilometers.

Bathymetric Contours and Soundings

Bathymetric contours will be shown in meters at intervals appropriate to map scale. Soundings will be shown in meters.

Universal Transverse Mercator (UTM) Grid

The full-line UTM grid will be shown in meters in accordance with provisions contained in the Statement on Reference Systems, dated August 23, 1974.

Planning for conversion to the metric system of the various map series will be accomplished in accordance with the following guidelines and will be coordinated with the States and other Federal agencies as appropriate.

Complete Metrication - preparation of fully metric maps, i.e., all map elements are shown in the metric system. Included in this category are:

- o New 1:25,000-scale 7.5-minute maps on agreement with the State.
- o Re-mapping, at 1:25,000 scale, of areas presently covered by 1:24,000-scale 7.5-minute maps.
- o New 1:50,000-scale and 1:100,000-scale county and standard-format maps (exception may be granted for ongoing county mapping program if States insist).
- o Complete revision of 1:250,000-scale series maps and 1:500,000-scale State base series maps.
- o New and complete revision of maps in the National Park Series and other special-area maps.
- o All future new-series national base maps.

Partial Metrication - preparation of maps where one or more map elements is in the metric system. Included in this category are:

- o New 1:24,000-scale 7.5-minute maps prepared with metric contours and elevations in States that prefer metrication but where it is agreed that 1:24,000-scale maps are needed temporarily to maintain scale continuity.
- o Standard and interim revision and reprints of existing 1:24,000-scale maps published at 1:25,000 scale on agreement with the State.

Deferred Metrication - partial or complete metrication deferred. Maps in this category include:

- o New 7.5-minute 1:24,000-scale maps prepared with foot-unit contours in States that prefer delaying converting to the metric system until complete 1:24,000-scale coverage is available for that State.

Approved by Dr. V.E. McKelvey
Director
U.S. Geological Survey
November 19, 1976

United States
Department of the Interior

GEOLOGICAL SURVEY

ADMINISTRATIVE DIGEST

NO. 759

August 1, 1977

THIS DIGEST IS PUBLISHED FROM TIME TO TIME AS A PART OF THE MANAGEMENT IMPROVEMENT PROGRAM

Think Metric

The International System of Units, as the metric system is officially called, provides for a single "language" to describe weights and measures over the world. We in the United States--together with the people of Brunei, Burma, and Yemen--are the only ones who have not put into effect this convenient system. In the passage of the Metric Conversion Act of 1975, Congress determined that we also will adopt it, but left the transition voluntary.

Recently, we determined that Geological Survey scientific publications, and most maps henceforth will use only metric units. With the metric system becoming the Survey language, the time has come for all of us to start thinking in metric terms.

Many people are turned away from use of the metric system because of the fear that they will have to learn a lot of complicated conversion factors, each involving a long string of decimals. To start thinking metric, however, it is only necessary to learn about ten rough approximations. If we need exact measurements, we can make them with instruments calibrated in metric units, just as we do in making measurements in English units, or we can refer to conversion tables and devices that are widely available. For many purposes, though, approximations are enough. All of us have an idea about the dimensions of a pound, quart, yard, or mile, but if we were to lay out one without a measure our determination wouldn't be very accurate. So why not forget the decimals and just think of a kilogram as a little more than two pounds, a liter as a little more than a quart, a meter as a little more than a yard, and a kilometer as a bit more than half a mile?

Applying the last approximation to figuring out the 55 mph speed limit in metric would give us about 110 kilometers per hour--too much on the high side of the 88 kmph represented by the exact conversion to keep us out of trouble. So for such a purpose it's better to use a little more exact conversion factor--1 kilometer = 0.6 mile--still easy for mental arithmetic.

Listed below are the conversion factors followed by the rough approximations that we need to have in mind while we are in the process of beginning to think metric in every day life. We say "in the process" because it won't take long to achieve enough basic familiarity with metric units to stop us from worrying about conversion factors altogether.

1 kilometer = 0.6 mile = about 1/2 mile

1 meter = 1.1 yards = about 1 yard or 3 feet

1 centimeter = 0.4 inches or about 1/2 inch

1 hectare = 2.5 acres

1 kilogram = 2.2 pounds or about 2 pounds

1 gram = 0.035 ounce (avoirdupois) or about 1 thirtieth of an ounce

1 liter = 1.06 quarts or about a quart

1 milliliter = 0.03 ounce (fluid) or about 1 thirtieth of an ounce

1 cubic meter = about 35 cubic feet or about 250 gallons

For temperature conversion, all one really needs to remember is that the freezing and boiling points of water on the Celsius scale are 0° and 100° respectively instead of 32° and 212° as on the Fahrenheit scale, and that "room temperature" is 20°C instead of 68°F. If we do need to convert from Celsius to Fahrenheit, in the temperature range of most weather reports it's close enough to multiply degrees C by 2 and add 30; or to divide degrees F by 2 and subtract 30 to convert Fahrenheit units to Celsius.

Some of these simple approximations are being used by manufacturers of kitchen measures which show, for example, a cup (1/2 pint) to be the same as 250 ml (milliliters) or 1/4 liter. This is the principle we're talking about--for many recipes it won't matter much whether a bit more or less milk or flour is added. Keep in mind that many recipes use such international approximations as a "pinch," "dash" and "walnut-size," But if a bit more or less does matter, use an exact metric measure or conversion factor. And start reading the labels on packages, cans, and bottles. Most manufacturers are now giving their contents in exact English and metric units, which will help us test and refine our approximations.

The benefits of "thinking metric" lie in the basic advantage of the system--its units increase or decrease by units of ten and the same prefixes, with rare exceptions, apply whether we're dealing with length, weight, or area. A kilometer is 1,000 meters, a kilogram 1,000 grams, a square kilometer is 1,000 meters squared. One of the rare exceptions is the term liter--a volume measure 1.06 times a quart, to which only the prefix milli(one thousandth) may apply. Remember that when we were learning the multiplication tables, we were home free when we got to the ten's. And, for purposes of the approximations mentioned above, recall that the fives weren't bad either.

In every day life, you won't need to know more prefixes than kilo (1,000 times, such as 1,000 grams), centi (one 100th, such as 100th of a gram) or milli (one 1,000th, such as 1,000th of a meter).

One other benefit of the metric system is that most basic units are easily relatable to one another. For example, a cubic centimeter (cm^3) of water weighs 1 gram, so 1,000 cm^3 weighs 1,000 grams, and a cubic meter of water (100 x 100 x 100 cm = 1,000,000 cm^3) in the English system weighs 1,000,000 grams or 1,000 kilograms. Of course, "a pint's a pound the world around." But where do you go from there? Well, to get the weight of a barrel of water, it would be 42 gallons (if you remember that factor) times 8 pints to the gallon times 1 pound a pint = 336 pounds. If you recall conversion factors of a pint to larger and smaller units you've got it made. Otherwise, you'll find it a joy to be thinking metric.

Precise conversion factors for units frequently used in Survey reports are listed in the attached leaflet "Conversion Factors--SI Metric and U.S. Customary Units." You won't need it to think metric but it's handy to have around in case you need a precise conversion.

V. E. McKelvey
Director

Attachment

DISTRIBUTION: E

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

December 7, 1976

Memorandum

To: All Geologists, Pacific Area

From: Acting Area Geologist, Pacific Area

Subject: Progress towards Metrication

Attached is the latest word on metrication in the USGS.

Vern

E. Vernon Stephens

Attachment

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

In Reply Refer To:
Mail Stop 440

OCT 3 0 1978

Memorandum

To: Chairman, Publications Committee

From: Chairman, Executive Committee

Subject: Use of Metric (SI) Units in Official Publications Series

It is the policy of the Geological Survey to encourage the use of metric (SI) units in the day-to-day activities of the organization. Survey's metrication goal is to convert completely to the use of metric units within the next decade; the specific timing for the complete conversion being dependent upon the availability of funds and manpower. However, certain program activities can accommodate the use of metrics earlier than others. One principal area is publications.

The official publications series of the Geological Survey are used principally for products that are destined for the scientific community in the United States. Members of this group are leaders in the effort to increase use of metrics in the earth sciences; therefore, there is little doubt as to their willingness to accept our products containing only metric units. However, it also is recognized that the value of some of our products to certain audiences may be somewhat diminished if complete changeover to metrics were at this time to be made in all reports and maps. Therefore, rather than an all-inclusive directive impacting on all Survey products, the decision as to which specific products should be exempted from use of metric units alone is left to the Division and Office Chiefs responsible for the operational programs of the Geological Survey. Some products that can be readily identified as belonging to each category are:

1. To Contain Metric Units Only:

   A. Journal of Geological Survey Research
   B. Bulletin series
   C. Geologic reports in the Professional Paper series

2. To Contain Customary Units for an Interim Period:

   A. Basic data reports
   B. Descriptive reports of local interest

C. Reports specifically prepared for cooperators' publication series (use of metrics at the discretion of the cooperators)
D. Topographic maps (see Metric Mapping Policy Statement)

By copy of this memorandum to the members of the Executive Committee I request that (1) those Survey products in Category 1.A above be immediately prepared in metric units alone, and (2) the members of the Executive Committee, as appropriate, establish effective procedures for evaluating products of their programs, other than those in category 1.A, to determine which may be exempted from use of metric units. The procedures should be effective as of January 1, 1977. The names of individuals assigned authority for exempting reports are to be furnished to the Chairman, Publications Committee.

The Metrics Panel emphasized in their briefing material that a major source of error in Survey manuscripts has been the use of dual units. They also indicated that this practice has not been an effective tool in familiarizing the reader with metrics. No adverse comments were received to their suggestion that the Survey do away with the use of dual units in its products. Therefore, also effective January 1, 1977, the publications of the Geological Survey need no longer contain dual units. Use of conversion tables in reports containing metric units alone is left to the discretion of the Division/Office Chief; those reports prepared in customary units should contain conversion tables.

W. A. Radlinski

W. A. Radlinski

cc: Members, Executive Committee
Editor, Journal of Research

United States Department of the Interior
GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

May 30, 1975

Memorandum

To: All Conservation Division Offices

From: Chief, Conservation Division

Subject: Metric Conversion

The Geological Survey began the task of converting to the metric system (Director's memorandum of March 9, 1973, copy enclosed), by requiring the use of dual English and Metric International System of Units (SI) in all publications.

Filed in Library

In addition to the NBS Publication 330 mentioned in the Director's memorandum, ASTM Publication E380-74, "Metric Practice Guide, (A guide to the Use of SI - the International System of Units)" is recommended for Division authors and editors, and for other personnel in need of converting from English to Metric (SI) units. A copy of this booklet is enclosed. Additional copies @ $1.39 each may be ordered from:

American Society for Testing and Materials
1916 Race Street,
Philadelphia, Pennsylvania 19103

Exceptions to the use of dual units in publications may be granted by the Division Chief, and questions regarding this should be referred to the Evaluation Standards and Publications Section. Because the audience for which our coal oriented reports and maps are prepared is limited, our Division will not use a metric equivalent for the Btu value of coal in these reports.

Chief, Conservation Division

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

COPY

March 9, 1973

Memorandum

To: Executive Committee

From: Director

Subject: Policy on use of metric and English units in Geological Survey Publications.

The United States now is one of the few nations of the world where non-metric units are still in common use. Efforts are underway in a number of places to begin the enormous task of conversion to the metric system. It is important that the Geological Survey be one of the leaders in this conversion. The following statement of policy is intended to get us started.

The Publications Committee, during a meeting held on November 20, 1972, recommended that:

1) Dual publication of metric--International System of units (SI) as listed in National Bureau of Standards Special Publication 330, revised 72 and English systems in USGS publications be obligatory commencing July 1, 1973.

   In recognition that selected publications will present some difficulties and have a high cost attached thereto, exceptions to the policy may be granted by the author's Division Chief.

2) Abbreviations for English (customary) units should not be as listed in Suggestions to Authors, p. 201-204. Instead, abbreviations should be written using exponents and/or solidus (ft^2, not sq ft; ft^3/s, not cfs) so that the units can be deciphered by someone unfamiliar with the field.

3) All Survey editors and reviewers should be advised of the policy decision and be instructed to edit in accordance with the decision.

These recommendations are hereby adopted as official Geological Survey policy. Implementation of this policy may be effected immediately; for manuscripts submitted on or after July 1, 1973, it is mandatory.

Some further guidance may be helpful. Where feasible, in reports intended primarily for scientific audiences, metric (S.I.) units should be given first, followed by subordinate English units in parentheses. In reports intended primarily for the general public, metric units should be subordinate in position. Maps and illustrations that carry a bar scale or other indication of dimensions or quantities should utilize both metric and English units. Exceptions to dual units, which may be granted in individual cases by Division Chiefs, can work either way--some reports (and maps) may appropriately use only English units; others only metric ones. Extensive tabular matter, numerical listings, and other types of data presentations frequently do not lend themselves to dual treatment; it is not our intent to require dual listings of massive amounts of data, which would thus double the size and cost of publication. In such cases use of conversion tables and dual-unit summaries may be appropriate.

Please disseminate this information throughout your organizations. It is expected that use of dual units in Survey publications, beginning in July 1973, will serve as a first step in what eventually will be total conversion to the metric system.

/s/ V.E. McKelvey

Director

United States Department of the Interior
GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

FEB 5 1976

Instruction Memorandum

To: All Conservation Division Offices

From: Chief, Conservation Division

Subject: Open-File Reports

.1 Objective. The Survey established the open-file system as a means of promptly releasing the results of investigations and studies on equal terms, and at the earliest possible date, to all interested individuals.

.2 Scope. Open-file reports include unpublished manuscript reports, maps, and other material made available for public consultation and use. They are a permanent form of publication and may be cited in other publications as sources of information.

.3 Policy. The Department provides for prompt public access to information about its activities in accord with longstanding Department policy (470 DM 1.1), as well as the provisions and spirit of the Freedom of Information Act. Survey policy (Survey Order No. 202) requires that all information gathered through investigations and observations by the Survey staff must be held confidential until it is made available to all, impartially and simultaneously, through formal publication or other approved means of public release, including open file. Exceptions for the Conservation Division include (1) furnishing administrative maps, well information, subsurface interpretations, and related data to lessees and operators as necessary for enforcement of the mineral leasing laws and promotion of sound prospecting and development practices; and (2) releasing results of an investigation to other Federal, State, and local governmental agencies to whom, under cooperative agreements or in the public interest, the observations and results of investigations should be available. However, when the results of an investigation are made available to such an agency prior to their general release to the public, the information must not be released to the public in any form until it has been so released by the Geological Survey, or until the Director has authorized its release by the other agency.

2-17-76/ CC to each geologist per VS.

.4 Authority.

A. Director. Authority to publish scientific and technical material has been delegated to the Bureau (470 DM 4.1, 471 DM 4.2B). The Director has retained the authority to approve the release for outside publication of all writings and data in which the Survey has a proprietary interest and all writings in which the author's title and Survey affiliation will be shown (SM 500.9).

B. Division Chief. All reports, maps, or other material intended for open-file release must be submitted to the Division Chief, through Division channels, for approval prior to submittal to the Director.

.5 Responsibility. The responsibilities at all levels in the Division for the preparation and processing of all publications, including open-file reports, are described in the attachment to the memorandum of the Division Chief, dated February 24, 1975, entitled "Responsibilities and Procedures for Processing Conservation Division Reports." The supervisor has the primary responsibility for assuring that the report or map meets the standards and requirements set forth in this memorandum and certifies to this by signing the supervisor's checklist, Attachment 2 of the above instruction memorandum.

.6 Standards.

A. General. The open-file system was established to permit release of a wide range of types of materials which may or may not be suitable for release in one of the formal Survey publication series. The material may range from (1) a report or map which has been reviewed and edited for publication, but for which immediate need to release exists; to (2) a map or document being released because of a Freedom of Information Act request. In the latter case, the document could be an unedited, unreviewed, incomplete worksheet or map, prepared by an employee no longer with the Survey, with no further changes in the document intended. The document would be so entitled to insure that the reader would know its nature and would be aware that errors in fact might exist.

Except for the rare case cited in item two above, all reports submitted for open-file release must be credible and well prepared. The work should be verified before, during, and after technical review to insure that it is free of contradictory facts and statements in the text and illustrations. The report must meet the requirement or need for which it has been prepared, thereby being something the Survey can support if the work is used for administrative or litigatory purposes.

B. Geologic Names Committee Review. Open-file reports are checked by a member of the Geologic Names Committee review staff only on request, usually by the author or his supervisor. An open-file report containing unpublished formal geologic or rock-stratigraphic unit names will not be approved by the Director unless it accompanies or follows a formal report in which the new names are introduced in the usual way. Any modification of established units will not be officially adopted on the basis of an open-file report. (Bluebook on Stratigraphic Nomenclature, 1974 edition, p. 9)

It is the responsibility of the author to make certain that no unpublished formal geologic names are used in his open-file report.

.7 Requirements.

A. Disclaimer. Because of the wide variety of material that may be released in the open-file system, a disclaimer is normally affixed to indicate that the material has not been edited to meet normal editorial standards or been reviewed by the Geologic Names Committee. The disclaimer does not indicate that the data presented are not accurate, nor that the report does not meet normal Survey technical standards as indicated in .6 above.

For normal use the disclaimer should read as follows:

> This map (or report) has not been edited for conformity with Geological Survey editorial standards or stratigraphic nomenclature.

B. Technical Review. Each report submitted for open file will receive sufficient review to assure that it meets the standards set forth in .6 above. Normally two technical reviews are required; however, more or less review may be given, depending on the experience of the author, and the circumstances under which the report is being released.

.8 Procedures.

A. Procedures for processing Conservation Division reports are given in the Division Chief's memorandum of February 24, 1975. All reports are processed using a Manuscript Review and Approval Sheet (MR&A), shown in Illustration 1, which provides for supervisor, Manager, and Division approval before submittal to the Director.

B. The Regional Conservation Manager forwards to Headquarters (ESP Section), along with 2 copies of the report and the MR&A Sheet, 1 copy of the completed transmittal memorandum (Illustration 2), 1 copy of technical review comments, and the Division checklist for supervisors.

Chief, Conservation Division

Enclosures:
Illustrations 1 and 2

This instructional memorandum is the first in a series to be issued by the Division Chief as recommended in the Task Force Report on the Onshore Lease Management Program, IV Ab(1). The formalized method to be employed is under current study and not yet finalized, therefore this format may not necessarily be the final result.

CONSERVATION DIVISION MANUSCRIPT REVIEW AND APPROVAL SHEET (MR & A) Rev. 12/7

TYPE OF PUBLICATION

SERIAL NO.

AUTHOR(S)

TITLE

NO. OF PAGES

NO. OF ILLUSTRATIONS

NO. OF TABLES

ENTER NEXT ROUTING HERE	DATE IN	DATE OUT	CHECK PROCESSING STEP WITH "X"													SIGN COMPLETION OF STEP OR APPROVAL HERE
			Author(s)	Area Sup.	Tech. review	Reg. Mgr.	G.N.C.	R & S.				ESP	Div. Hdqtrs.	Div. Chief	Director	
AUTHOR(S)	▨															

Memorandum

Date

To: Branch of Plans and Program Management,
Publications Division - Stop 329

From:

Subject: New USGS open-file report

The following report was authorized by _____ for the Director on _____ for release in the open files:

TITLE:

AUTHOR(S):

CONTENTS: _____p. _____pls., _____figs., _____tables.

Map scale: _____

Depositories:

Release date: _____

Area: _____

Report No. _____

(*) Asterisks indicate depositories holding reproducibles.

IN REPLY REFER TO

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
FEDERAL CENTER, DENVER, COLORADO 80225

MEMORANDUM

May 8, 1975

To : Authors of geologic reports

From : M. MacLachlan, Geologic Names Committee, Review Staff

Subject: Open-file reports

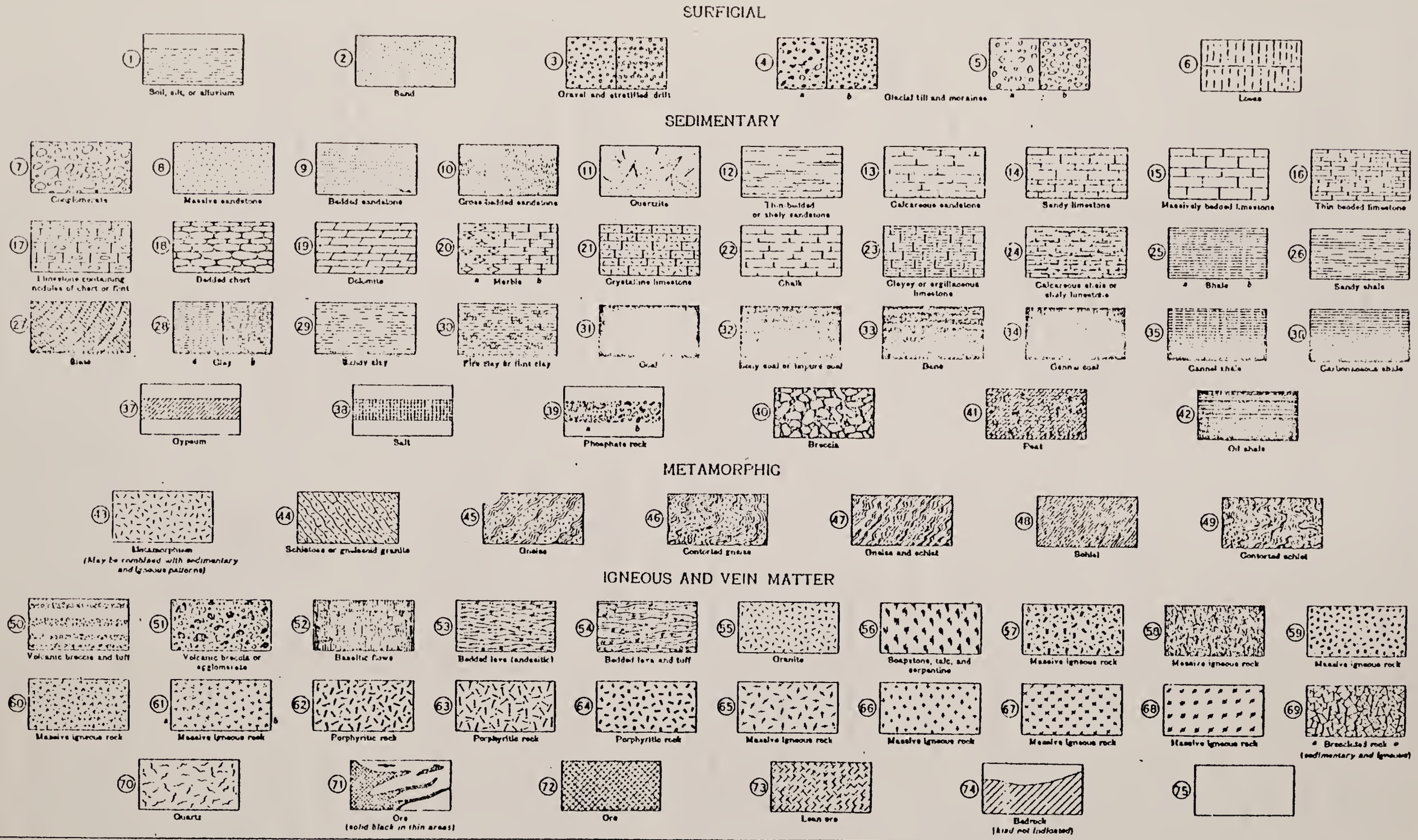
Because of the increase in the number of open-file reports released by the U.S. Geological Survey due to the Freedom of Information Act, it seems wise at this time to restate the Geologic Names Committee policy concerning open-file reports.

Open-file reports are checked by a member of the Geologic Names Committee Review Staff only on request, usually by the author or his Branch Chief. An open-file report containing unpublished formal geologic or rock-stratigraphic unit names will not be approved by the Director except when it accompanies or follows a formal report in which the new names are introduced in the usual way. Any modification of established units will not be officially adopted on the basis of an open-file report. (Bluebook on Stratigraphic Nomenclature, 1974 edition, p. 9.)

It is the responsibility of the author to make certain that no unpublished formal geologic names are used in his open-file report.

If an author must open-file a report that includes unpublished geologic names, he may use the following very simple and very expedient technique throughout his report. As you all know, formal rock-stratigraphic unit names are binomial, and in any given word sequence the geographic name is listed first and the stratigraphic rank or lithology second. Therefore, a name perhaps originally intended as a new name, the Fort Collins Limestone for example, can be transposed everywhere in your report to limestone of, at, or near [choose the preposition you prefer] Fort Collins, thus avoiding any implication of formality.

All open-file reports containing geologic names and ages should include the usual U.S. Geological Survey nomenclature disclaimer on the title page.



LITHOLOGIC SYMBOLS USED IN STRUCTURE AND COLUMNAR SECTIONS TO REPRESENT DIFFERENT KINDS OF ROCK

GEOLOGIC MAP SYMBOLS OF THE U. S. GEOLOGICAL SURVEY

Recommended geologic map symbols for publications of the U. S. Geological Survey are given in the following list, which is arranged in order of the usual appearance of the map symbol in an explanation: this order may be altered for emphasis. This list is not comprehensive and variations in the recommended symbols may be made to meet particular geologic situations

OUTCROPS

Make all outcrop line weights .005 in.

DESCRIPTION	SYMBOL	NOTE
Bedrock outcrop		Solid where mapped, patterned where too abundant to map separately. Generally shown in color
Limit of outcrop		Used on detailed bedrock maps where soil and surficial deposits conceal much of surface. Outcrop area generally screened or in neutral gray

COAL AND OTHER ECONOMICALLY IMPORTANT BEDS

Make all coal line weights .010 in.

Coal bed *Dashed where approximately located, dotted where concealed. Thickness of coal, in feet, measured at triangle*	1.5 hz	Letters designate coal bed. May be shown in color if necessary. Width of line not drawn to scale. May be used for other economically important beds such as bentonite and phosphate
Clinkered coal bed		Shown in same color as coal bed

CONTACTS

Boundaries between geologic formations or other rock units. Symbols should be combined to fit available space where practical. Preferred phrasing when several types of contacts are mapped and combined in the explanation: *Long-dashed where approximately located; short-dashed where inferred; dotted where concealed; queried where doubtful.* Contact line symbols signify accuracy of location or character of exposure; only solid line contacts used for maps at scales smaller than 1:125,000 (1:250,000; 1:500,000; 1:1,000,000). Generally full line implies accuracy of placement within 1/50 in. at scale of map. If symbols give engineering accuracy of location of contact, standard used in mapping should be given in italics. Coal and other economically important beds may also be used for contacts. Make all contact line weights .005 in.

Contact		A line weight of .004" in. may be used if geology is congested
Contact, showing dip	45 90	If known show top side of vertical contact by single arrow and 90
Overturned contact, showing dip	65	
Approximate contact		Not surely located within 1/50 in. at scale of map
Indefinite contact		Insufficient data to establish contact with certainty
Inferred contact		No data to establish contact but contact must be present
Gradational contact		Continuous change from one lithology or rock type to another. Contact arbitrary
Concealed contact		Must be beneath mapped geologic unit, water, or ice
Contact, located by ground magnetic survey		Contacts determined by instrumentation or by other than conventional surface geologic methods may require special symbols for differentiation
Contact, located by airborne magnetic survey		

January 1964

FAULTS

Same line conventions used for faults as for contacts: Preferred phrasing when several line conventions are used for faults and combined in the explanation: *Long-dashed where approximately located; short-dashed where inferred; dotted where concealed; queried where doubtful.* *U, upthrown side; D, downthrown side.* Generally make fault line weights .015 in.; relative importance of faults may be shown by width of line and suitable explanation. Dip shown where observed or known

Fault		Weight of line may vary with density of map
Fault, showing dip	60 90	
Fault, approximately located		Not surely located within 1/50 in. at scale of map
Inferred fault		Evidence for fault only indirect
Probable or doubtful fault		Use probable or doubtful, not both. Queries, spaced three or more dashes apart, indicate uncertainty of existence, not location. Probable is more definite than doubtful
Concealed fault		Must be concealed by overlying mapped deposits or water
Hypothetical fault		Existence from indirect geologic evidence; could be explained by causes other than faulting
Fault, located by ground magnetic survey		
Fault, located by airborne magnetic survey		
Fault or lineament from aerial photographs. *Not checked or not identified on ground*		
Lineament		Used on small scale tectonic maps. Add lineament name where possible. Make line weight .010 in.
Fault *Showing bearing and plunge of grooves, striations, or slickensides*	55	Plunge measured in vertical plane. Identify type of evidence observed in italic statement
Fault, showing dip U, *upthrown side;* D, *downthrown side*	U D 65	High angle, used in combination with dip arrow to indicate apparent normal or reverse movement
Fault *Bar and ball on downthrown side*		Generally used where space does not allow U and D symbols without confusion
Fault showing relative horizontal movement		
Fault *Showing bearing and plunge of apparently downthrown block*	D 65 Normal; D 43 Reverse	Where displacement is given in feet, vertical numbers should be used
Normal fault *Hachures on apparently downthrown side*		Use on tectonic maps or where space does not permit use of U and D
Reverse fault R, *upthrown side*		Angle of dip originally greater than 45° but precise value indeterminate. Hanging wall believed to have moved upward in respect to footwall
Thrust fault T, *upper plate*	50	Angle of dip originally less than 45°. Dip of fault, where known, shown by barbed arrow
Thrust fault *Sawteeth on upper plate*		Symbol emphasizes fault; arrangement of teeth may separate thrust faulting of different ages. May be limited to major thrust faults
Overturned thrust fault *Sawteeth in direction of dip; bar on side of tectonically higher plate*		
Fault (shear or mylonite) zone, showing dip	57	Show relative movement by U and D or arrows. Make line weights .005 in.
Fault breccia		Extent may be outlined by faults or shown only where observed. Used as overprint for broad areas of fault breccia. Make line weight .005 in.
Fault, intruded by dike		Use on small scale black and white map or for narrow dike. On colored maps show dike in color and fault movement by U and D
Fault, intruded by dike		Use on large scale black and white map for dike of sufficient width to be mapped. Former location of fault shown. Dikes usually shown in color

FOLDS

Same line conventions used for folds as for contacts and faults. Preferred phrasing when more than one line convention used for anticline: *Long-dashed where approximately located; short-dashed where inferred; dotted where concealed; queried where doubtful.* Make fold line weights .010 in.

ANTICLINES

Anticline *Showing crestline*		On detailed geologic maps of overturned folds and in areas of high relief trace of axial surface may be shown; use "Anticline *Showing trace of axial surface*". Line weight of .008 in. may be used if folds are congested
Anticline *Showing crestline and direction of plunge*		
Anticline *Showing crestline and plunge*	20	
Asymmetric anticline *Showing crestline and plunge. Short arrow indicates steeper limb*	15	
Asymmetric anticline *Showing dip of limbs and plunge*	20 50 20	
Overturned anticline *Showing direction of dip of limbs and plunge*	10	
Inferred anticline		Based on indirect geologic evidence; location probably not within 1/25 in. at scale of map
Probable or doubtful anticline		Use probable or doubtful, not both. Queries indicate doubt of existence of anticline from available data; location may also be in doubt. Probable is more definite than doubtful
Concealed anticline		Must be beneath a mapped geologic unit or covered by water. Not shown where extension of known anticline is obvious
Dome		Generally used on small scale tectonic maps only. Make line weights .005 in.
Inverted anticline *Arrows show direction of dip of limbs*		Beds inverted near trough
Antiform *Drawn on foliation, cleavage, or bedding*		Convex upward: structure in metamorphic rocks or in bedded rocks where tops are not known

SYNCLINES

Preferred phrasing when more than one line convention used same as for anticline

Syncline *Showing troughline*		On detailed geologic maps in areas of high relief trace of axial surface may be shown; use "Syncline *Showing trace of axial surface*"
Syncline *Showing troughline and direction of plunge*		Line weight of .003 may be used if folds are congested
Syncline *Showing troughline and plunge*	15	If, because of topography and the character of the fold, the troughline or trace of axial surface differ appreciably from the real direction of plunge show as 15
Asymmetric syncline *Showing troughline and plunge. Short arrow indicates steeper limb*		
Asymmetric syncline *Showing dip of limbs and plunge*	15 50 20	
Overturned syncline *Showing direction of dip of limbs and plunge*		

FOLDS

SYNCLINES (CON'T)

Inferred syncline		Based on indirect geologic evidence. Location probably not within 1/25 in. at scale of map
Probable or doubtful syncline		Use probable or doubtful, not both. Queries indicate doubt of existence. Probable is more definite than doubtful
Concealed syncline		Must be beneath mapped geologic unit or covered by water. Not shown where extension of known syncline is obvious
Basin		
Inverted syncline *Arrows show direction of dip of limbs*		Beds inverted near crest
Synform *Drawn on foliation, cleavage, or bedding*		Convex downward: structure in metamorphic rocks or in bedded rocks where tops are not known

MONOCLINES

May be classified as inferred, probable, doubtful, or concealed by same line conventions used for anticlines and synclines. Make all line weights .010 in.

Monocline *Showing trace and plunge of axes. Dashed where approximately located*		
Anticlinal bend *Showing trace and plunge of axis. Dashed where approximately located*	A	Use on large scale detailed maps where anticlinal and synclinal bends diverge sufficiently to be mapped
Synclinal bend *Showing trace and plunge of axis. Dashed where approximately located*	S	

MINOR FOLD AXES

Make all line weights .005 in.

Minor anticline, showing plunge	60	
Minor syncline, showing plunge	45	Plunge measured in vertical plane
Minor fold axis, showing plunge	15	
Minor fold axis, horizontal		
Minor folds *Showing plunge of axes*	20	Used where beds are too tightly folded to show axes of individual folds separately. Used to indicate sense of observed folds

PLANAR FEATURES

Planar symbols (strike and dip of beds, foliation or schistosity, and cleavage) can be combined with linear symbols to record data observed at same locality by superimposing symbols at point of observation. Co-existing planar symbols are shown intersecting at point of observation. All combinations of planar and linear symbols used on map need not be shown in explanation.

A statement "Planar and linear symbols may be combined" placed beneath PLANAR FEATURES AND LINEAR FEATURES in explanation is adequate. Use .005 in. line weight on all symbols. Examples of combined planar and linear features and coexisting planar features shown at appropriate places

BEDDING

Strike and dip of beds	50	Strike of vertical beds *Top of beds known*	
Strike and dip of beds *Top of beds known from sedimentary features* *(Used only in areas of complex structure where overturning also is recognized)*	90	Component of dip *Dot marks point of observation* *(Do not use if symbols for lineation in metamorphic rocks on map)*	
Strike and dip of overturned beds	65	Horizontal beds	
Strike and dip of overturned beds *Top of beds known*	65	Strike and dip of beds and plunge of slickensides	33 25
Strike of vertical beds		Crumpled, plicated, crenulated, or undulatory beds and average dip	55

FOLIATION OR SCHISTOSITY

Strike and dip of foliation	20	Strike and dip of foliation and parallel bedding	10
Strike of vertical foliation *Relationship of foliation (or schistosity) to bedding not shown in outcrop*		Strike of vertical foliation and parallel bedding	
		Strike and dip of foliation and parallel overturned bedding	22
Horizontal foliation		Horizontal foliation and bedding	

CLEAVAGE

Strike and dip of cleavage	16	Inclined Vertical Horizontal *(Contrasting symbols can be used to distinguish between different kinds of planar structures (slip cleavage, compositional layering, flow structure). Type of planar structure should be specified in explanation)*	
Strike of vertical cleavage			
Horizontal cleavage			

LINEAR FEATURES

May be combined with the above planar symbols as shown:

Bearing and plunge of lineation	15	Vertical beds, showing horizontal lineation	
Vertical lineation *(Use open symbol in combination with line symbols)*		Horizontal beds, showing trend of horizontal lineation	
Horizontal lineation		Vertical beds showing plunge of lineation	
Strike and dip of foliation and plunge of lineation	38 75	Approximate strike of folded beds showing plunge of fold axes	80
Vertical foliation showing horizontal lineation		Attitude of overturned beds and parallel foliation	75
Strike and dip of foliation showing horizontal lineation	50	Attitude of foliation and overturned beds, strikes parallel but dips differ	50 30
		Double lineation	38 35
Strike and dip of beds and plunge of lineation	14 25	Strike and dip of beds and intersecting slip cleavage *(Symbols joined at point of observation)*	30 40
Vertical foliation and vertical lineation			
Strike of vertical foliation showing plunge of lineation	82	Strike and dip of beds and intersecting slip cleavage	70 20

JOINTS

Open symbols may be contrasted with closed symbols to separate unmineralized and mineralized joints

Strike and dip of joints	70	Strikes and dips of multiple joints *(Dip symbols shifted along strike for legibility, location of observations at point of intersection)*	50 40 50
Strike of vertical joints			
Horizontal joints			

CONTOURS AND ISOPLETHS

Generally printed in red or other contrasting color but may be shown in black where basic geology and base map are simple. Label and make every 5th contour heavier. Use .015 in. for heavy contours and .008 in. for light contours. May be used for many kinds of geologic data

Structure contours *Drawn on top (or base) of* (give geologic horizon) *Long-dashed where control less accurate; short-dashed where datum is above land surface. Contour interval 20 ft. Arrow indicates direction of dip* *(Structure contours generally not shown as concealed; may be omitted in areas of no information. Arrows used only where index contours fail to show dip)*	500 400	Isoradioactivity contour *Interval 50 counts per second* (airborne surveys). *Interval in microroentgens per hour* (ground surveys)	
Outcrop point used for structural control	×	Lines of equal Bouguer anomaly *Dashed in areas of poor control. Contour interval 1 milligal*	
Magnetic contours and flight traverse *Contours show total magnetic intensity relative to an arbitrary datum, dashed where data incomplete. Ticks mark flight traverses* *(Give contour interval below map with map scale)*	900	Gravity station and number	G 65
Magnetic contour enclosing area of lower magnetic intensity		Isopachs	
Measured maximum or minimum intensity within closed high or closed low contour	×	Isograds *(Add key mineral names to map and describe in explanation)*	SILLIMANITE STAUROLITE

VEINS, ORE, WALL-ROCK ALTERATION, AND DIKES

Shown in color, generally red, only where necessary to differentiate types and grade

Vein, showing dip *(Give mineralogy and grade of mineralization in percent metal or oxide, or oz. per ton by notes. Can also be shown in solid color)*	65	Mineralized stringers or veinlets *(Dots used only to distinguish mineralized from unmineralized joints, faults, or contacts when illustration is black and white)*	
Ore body		Altered wall rock *Showing intensity of alteration by concentration of dots*	
		Dike *(May be shown in color without ×'s when essential to distinguish different rock types)*	

ORE IN SEDIMENTARY ROCKS AND SEDIMENTARY FEATURES CONTROLLING ORE DEPOSITION

Strike of roll *Showing geometric configuration in cross section* *(Explain configuration by note)*		Fossil log	
Direction of plunge of cross stratification in sandstone *Showing direction of flow of depositing stream* *(Based on measurements of dips of crossbedding)*		Lineation trend	
		Festoon trend	

SYMBOLS FOR SECTIONS

Thrust *Arrow shows relative direction of movement*		Drill hole or well on section *Showing surface altitude and total depth in ft* *(Angle of deviation from vertical plotted)*	2349 TD2276
Fault *Arrows show relative direction of movement*			
Fault, showing lateral movement T, *towards observer*; A, *away from observer* *(May be combined with arrows to show strike slip and dip slip movement)*	T A	Drill hole or well projected to section *Showing surface altitude and total depth in ft*	4523 TD2795

SURFACE OPENINGS AND EXPLORATION
LARGE SCALE MAPS

Vertical shaft		Drill hole	
Inclined shaft		Drill hole *No geologic data available*	ND
Portal or adit		Drill hole, low-grade ore *(Give definition of low and high grade in explanation)*	
Portal and open cut		Drill hole, high-grade ore	
Trench		Drill hole, inclined *Showing bearing and inclination; surface position and elevation; vertical projection of bedrock surface bottom of hole, and thickness of overburden; and length of hole* *(Combine drill hole collar symbols as required with vertical projection to map)*	5280 -45° 50
Prospect pit or open cut			
Mine dump			

SMALL SCALE MAPS
Symbols not drawn to scale. Vary size of symbols with density of data

Shaft		Trench	
Inclined shaft		Prospect pit	x
Portal of tunnel, adit, or slope		Sand, gravel, clay, or placer pit	
Inaccessible tunnel, adit, or slope		Mine, quarry, glory hole, or open pit	

UNDERGROUND WORKINGS AND EXPLORATION
Symbols drawn to scale on large-scale maps

Shaft at surface		Ore chute	
Shaft, above and below level		Stope *(Can also be explained by note, "Stoped above" or "Stoped below")*	
Bottom of shaft *(Show bottom of sump by note on map of lower level)*		Elevation of roof or back	250
Inclined workings, above and below level, *Chevrons point down* *(Spacing of chevrons may indicate steepness; place at regular vertical intervals — 5, 10, 20, etc. ft.)*		Elevation of floor or sill	350
		Lagging or cribbing along drift	Tightly lagged
Winze or head of raise		Caved or otherwise inaccessible workings	
Raise or winze extending through level		Drill hole *(Give inclination of hole + or — in degrees in note and show vertical projection of bottom of hole to map)*	-45
Raise or foot of winze			

OIL AND GAS WELLS

Symbols for wells drilled for oil and gas are made up of seven compatible basic symbols which may be superimposed as necessary to show reported conditions

Drilling well or Well location		Show of gas	
Dry hole or Abandoned well		Shut in well	
Gas well		Well *Showing vertical projection of bottom of hole, total depth, and surface altitude*	5000 TD 2000
Oil well		Dry hole *Showing formation and altitude at surface formation at bottom of hole, and total depth*	Km 2809 / Kd 4956
Show of oil			

MISCELLANEOUS

Glacial striae		Line of section *(Generally omitted from explanation; used only to avoid confusion with other lines)*	A A′
Line of stratigraphic section			

WATER WELLS AND SPRINGS

Nonflowing well		Flowing well with pumping plant	
Flowing well		Spring	
Test hole, abandoned, or not in use		Thermal spring	T T
Nonflowing well with pumping plant *(Generally shown on blue (drainage) base plate in ground-water and surface-water reports)*		Mineral spring	M M

CROSS SECTION CHRONOFLEX

1:6,000 10' interval 50' index	1:12,000 20' 100'	1:24,000 40' 200'	1:48,000 80' 400'	
1:96,000 160' interval 80' index	1:62,500 80' 40'			9.33 sq. ft
1:15,840 40' interval 200' index	1:31,680 80' 400'	1:63,360 160' 800'		8.75 sq. ft
1:63,360 500' index 100' interval				7.75 sq. ft
1:62,500 100' interval 500' index				7.00 sq. ft
1:62,500 200' interval 1000' index	1:125,000 400' 2000'	1:250,000 800' 4000'	1:500,000 1,600' 8000'	9.33 sq. ft
1:10,000 20' interval 100' index	1:20,000 40' 200'	1:40,000 80' 400'		9.26 sq. ft
1:12,000	1:24,000	1:48,000 100' interval		9.33 sq. ft

February 22, 1977

MEMORANDUM

TO: Authors, ~~Geologic Division~~

FROM: M-TRU

SUBJECT: Open-file reports

An increasingly large proportion of Survey publications are Open-file releases (more than half in some months) and because their accessibility to the public is limited, the information carried in their announcement in the Survey's published monthly list of publications should be as accurate and complete as possible. The most common failing is tardiness in sending copies to listed depositories--some arrive months after the announced date. Frequently, the delay is caused by time required for the photographic steps necessary to prepare reproducible copies of maps--which can amount to weeks and typically is not anticipated by authors.

Although preparation of depository copies is the author's responsibility, TRU will help, specifically in obtaining reproducible copies of large illustrations, especially maps, that cannot be xeroxed. We urge you to consult a map editor regarding the minimum data required on an Open-file map, even though you may already have the necessary reproducible copies. TRU will also mail copies to the depositories. For those unfamiliar with procedures followed in handling Open-file reports, the steps are described and diagrammed below.

1.--Report is submitted to Branch Chief who determines whether or not it needs review and revision and who ultimately sends the report to TRU. As soon as the decision to open-file is made, you can expedite early release by consulting a Geologic Map Editor for advice on preparation of reproducible copies of maps and large illustrations. If report must be entirely retyped after review, use single spacing. Otherwise, leave it double spaced.

2.--When report (2 copies) arrives at TRU, make sure it includes, in addition to the route sheet, a completed form-memo to Betsy Weld, Geologic Division, Reston (see attachment #1), that contains the information to be carried by the announcement in the monthly list of publications. These forms should be available at all Branch offices. Fill in all applicable information requested on the form. Especially critical is the list of depositories where the report is to be held, including depositories designated to hold reproducible copies of maps or other large illustrations. If you are uncertain, call us for advice concerning depositories. The minimum depository list comprises the three Survey libraries--Reston, Denver, and Menlo Park. Other commonly used depositories are listed in the monthly list of publications. You may also wish to use additional depositories in order to include areas of

known interest, fulfill the request of a State Geologist, or for other reasons.

If the report deals with Alaska or the Arctic seas, call Mary Tailleur (X2342) for further information regarding depositories for these areas. A specially designed form-memo (attachment #3) is also available at the Alaskan and Marine Branch offices.

Near the bottom of the form, note that "Approx." is crossed out. This is because the date should be as realistic as possible--often, it WILL be approximate at best!

3.--Immediately above "Approx.", the "...Open-file transmittal form..." refers to another form-memo (attachment #2), this one from the Chief, Office of Scientific Publications, Geol. Div., to Publications Div. This memo accompanies the ms. when it is RETURNED after Director's approval and contains, in slightly different form, the information you, the author, supplied on the original form. It also contains the OPEN-FILE NUMBER that must appear on the title page and/or map, on depository copies. The memo serves two main purposes: (1) it triggers the announcement of the report in the next issue of the monthly list of publications, and (2) it is attached to copies of the report mailed to depositories, thereby informing them of the report's distribution and the location of reproducible copies. Additional copies can be mailed to other non-depository Public Inquiry Offices where they also serve as an announcement.

4.--Title page of the report (or map, if not accompanied by text) must carry the disclaimer--

U. S. Geological Survey
OPEN FILE REPORT (MAP)
This report (map) is preliminary and has
not been edited or reviewed for conform-
ity with Geological Survey standards

--which means exactly that; the only person in TRU who looks at Open-file reports is the Chief, a very poor editor indeed! Although somewhat excused by the disclaimer, the manuscript should nevertheless represent the author's best efforts. Because it will appear in bibliographies by title only, the title should be truly informative.

Increased use of Open-file release for Survey reports is undoubtedly a response to increased pressure to make information available to the public promptly, and because it is the most rapid form of publication, we should anticipate, and thereby avoid, delays.

ATTACHMENT #1

To: Betsy Weld, Geologic Div. (Reston, Stop 904)

From: Menlo TR Unit

Subject: Open file report

Following is the needed information for announcement of open-file report in the Monthly List of USGS Publications:

Title: Geology of the Oil Center, Rio Bravo Ranch, Lamont and Edison quadrangles, California

Author(s): J. A. Bartow and M. P. Doukas

SAMPLE

No. of pages: Scale of map: 1:62,500

No. of plates: 4

No. of text figs.:

No. of tables:

List of depositories: USGS Library, Room 4A100, 12201 Sunrise Valley Dr., Reston, VA 22092
USGS Library, 1526 Cole Blvd. at West Colfax Ave., Golden, CO (Mail Address: Stop 914 Box 25046, Federal Center, Denver, 80225)
USGS Library, 345 Middlefield Rd., Menlo Park, CA 94025
USGS, Room 504, Custom House, 555 Battery St., San Francisco, CA 94111
USGS, Room 7638, Federal Bldg., 300 North Los Angeles St., Los Angeles, CA 90012

Depositories holding reproducibles (if any): USGS Library, 345 Middlefield Rd., Menlo Park, CA 94025

No. of copies of open-file transmittal form needed by TR Unit: 4
of transmittal form

No. of copies needed by Branch Chief or others: 5
(Name & no.)

Approx. date when depository copies will be ready: August 10, 1976

ATTACHMENT #2

U.S. GEOLOGICAL SURVEY
Reston, Va. 22092

Memorandum

Date
Aug 2, 1976

To: Branch of Plans and Program Management, Publications Division - Stop 329

From: Chief, Office of Scientific Publications

Subject: New USGS Open-file report

The following report was authorized by W. P. Ketterer for the Director on Jul 30, 1976 for release in the open files:

TITLE: Geology of the Oil Center, Rio Bravo Ranch, Lamont and Edison quadrangles, California

SAMPLE

AUTHOR(S): J. A. Bartow and M. P. Doukas

CONTENTS: ____p., 4 pls., ____figs., ____tables.

Map scale: 1:62,500

Depositories:

USGS Library, Room 4A100, 12201 Sunrise Valley Dr., Reston, VA 22092
USGS Library, 1526 Cole Blvd. at West Colfax Ave., Golden, CO
(Mail address: Stop 914, Box 25046, Federal Center, Denver, CO 80225)
* USGS Library, 345 Middlefield Rd., Menlo Park, CA 94025
USGS, Room 504, Custom House, 555 Battery St., San Francisco, CA 94111
USGS, Room 7638, Federal Bldg., 300 North Los Angeles St., Los Angeles, CA 90012

(*) Asterisks indicate depositories holding reproducibles

Release date: AUGUST

Area: CALIFORNIA

Report No. 76-592

ATTACHMENT #3

To: Betsy Weld, Geologic Div. (Reston, Stop 904)
From: Menlo Park, TRUnit (and Alaskan Tech Data Unit)
Subject: OPEN-FILE REPORT

Following is the needed information for announcement of open-file report in the Monthly List of USGS Publications:

TITLE: .

Author(s):

No. of pages: No. of plates: No. of text figs.
No. of tables: Scale of Map:
Other:

List of Depositories:

( ) NC USGS Library - Reston, VA.
( ) Da USGS Library - Denver, CO. (Golden, CO.)
( ) M USGS Library - Menlo Park, CA.
( ) A Public Inquiries Office, Anchorage, AK.
( ) LA Public Inquiries Office, Los Angeles, CA.
( ) Db Public Inquiries Office, Denver, CO.
( ) S Public Inquiries Office, Spokane, WA.
( ) SF Public Inquiries Office, San Francisco, CA.

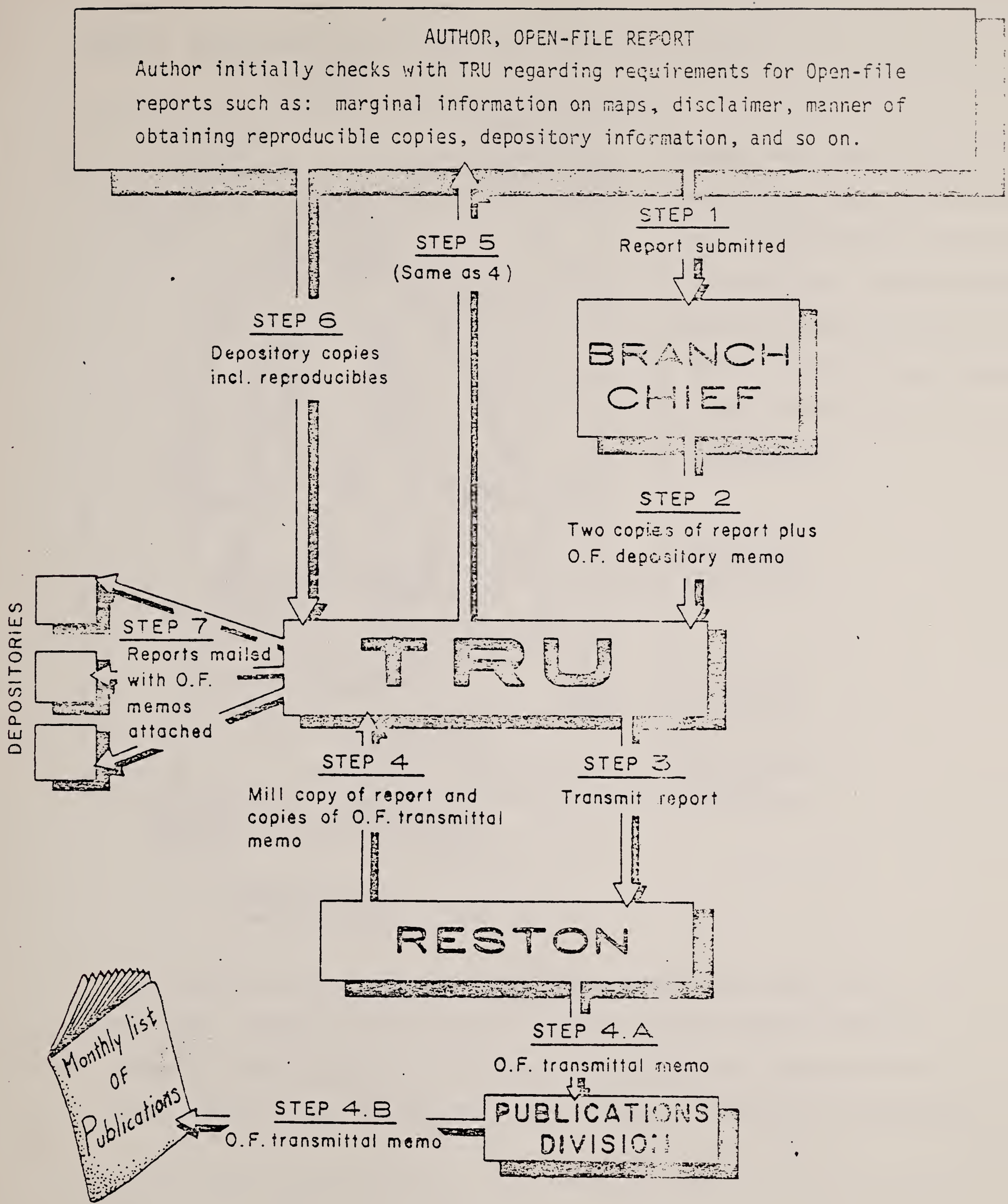
( ) USGS, Natural Resources Bldg., University of Alaska, College, AK. (Mailing address: P. O. Box 80586, Fairbanks, AK. 99708)
( ) Alaska Division of Geological and Geophysical Surveys, 3001 Porcupine Drive, Anchorage, AK. 99504 and P. O. Box 80007, Fairbanks, AK 99708
( ) Other(s):

Depositories holding reproducibles (if any):

( ) entire report may be xeroxed
( ) USGS Library - 345 Middlefield Rd., Menlo Park, CA. 94025
( ) Public Inquiries Office, USGS, Rm. 108 Skyline Bldg., 508 2d Ave., Anchorage, AK. 99501
( ) Other(s):

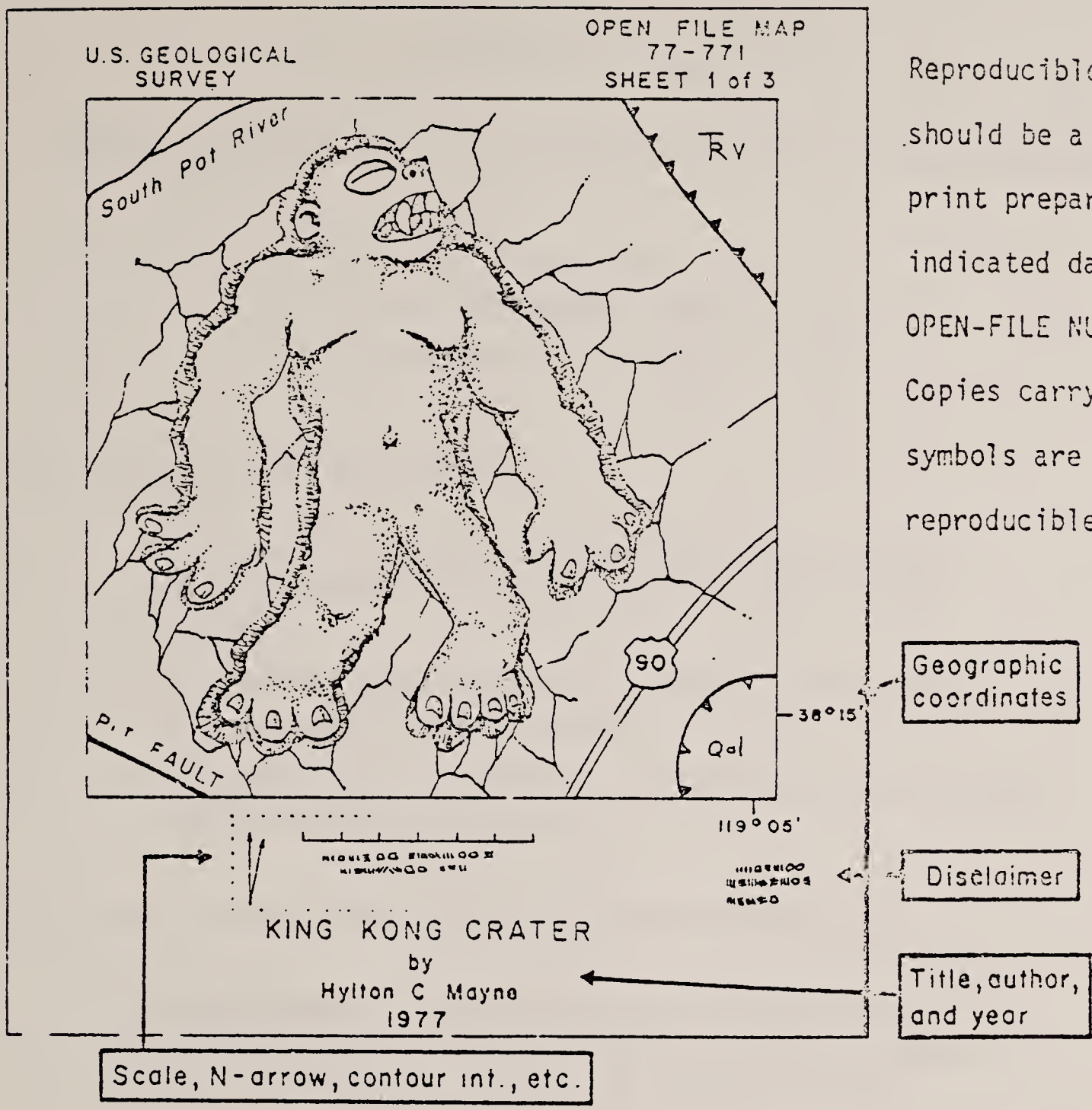
No. of copies of open-file transmittal form needed by TRUnit: _____
No. of copies needed by Branch Chief: _____
No. of copies needed by others: Alaskan Tech Data Unit, MS # 48

~~Approx.~~ date when depository copies will be ready: _____


AUTHOR, OPEN-FILE REPORT
Author initially checks with TRU regarding requirements for Open-file reports such as: marginal information on maps, disclaimer, manner of obtaining reproducible copies, depository information, and so on.
STEP 1
Report submitted
STEP 5
(Same as 4)
STEP 6
Depository copies incl. reproducibles
BRANCH CHIEF
STEP 2
Two copies of report plus O.F. depository memo
DEPOSITORIES
STEP 7
Reports mailed with O.F. memos attached
TRU
STEP 4
Mill copy of report and copies of O.F. transmittal memo
STEP 3
Transmit report
RESTON
STEP 4.A
O.F. transmittal memo
Monthly list of Publications
STEP 4.B
O.F. transmittal memo
PUBLICATIONS DIVISION

BASIC REQUIREMENTS OF AN OPEN FILE—

MAP



Reproducible copy preferably should be a black line cronaflex print prepared after all the indicated data, including the OPEN-FILE NUMBER, are added. Copies carrying stickup type or symbols are NOT acceptable as reproducibles.

REPORT

Should contain a title page bearing the title, author, year, Open-file no. and disclaimer. Legible prints of photos--not xerox copies--should accompany all depository copies, especially if the photos are critical to understanding the report. Use of photos in Open-file reports, however, is generally discouraged.

Steve Wulf - Base Map Unit (Oak Grove)

—ANNOUNCING—

DIRECT-MAIL SALES OF USGS OPEN-FILE REPORTS

BY THE
U.S. GEOLOGICAL SURVEY
EFFECTIVE OCTOBER 1, 1977

PURPOSE OF PROGRAM...

- To furnish microfiche or paper-duplicate copies of open-file reports from a single, centrally-located facility.
- To provide faster order-filling service to the public for copies of open-file reports.
- To increase the availability of earth-science information to the scientific community.

ORDER USGS OPEN-FILE REPORTS FROM:

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This facility will stock open-file reports only. Please do not mix orders for open-file reports with orders for any other USGS products. Checks or money orders, in exact amount for open-file reports ordered, should be made payable to U.S. Geological Survey. Prepayment is required.

Order by series and number (such as Open-File Report 77-123) and complete title.

Inquiries concerning this new program should be sent to the address given above.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

September 30, 1971

Memorandum

To: Director, Geological Survey

From: Director, Audit Operations
Office of Survey and Review

Subject: Audit report, "Coordination on Mineral Land Classification Activities," Geological Survey

The enclosed report suggests that, as a byproduct of geological mapping and other activities, the Geologic Division can provide the Branch of Mineral Classification, Conservation Division, with sufficient information to classify Federal lands for mineral leasing purposes. Since action has already been taken to achieve the needed coordination, a reply to this report is not required.

We appreciate the quick response to the draft report and the excellent cooperation received during the audit.

James R. Price

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

May 16, 1975

Memorandum

To: Conservation Managers
Area Supervisors
District Supervisors
Area Geologists
Area Hydraulic Engineers
District Hydraulic Engineers

From: Chief, Conservation Division

Subject: Projects

A proposed project is submitted by an area supervisor for review by the Regional Manager and approval by the Chief, Conservation Division. The objectives, justification, and funding must be carefully outlined. No project can be activated until approved by the Division Chief.

Definition

A project is a planned undertaking, a definitely formulated work unit or piece of research that requires more than one month to complete including office drafting and secretarial support. Projects usually are broad in scope, require a considerable expenditure of professional time and money, and involve subjects of interest to other Divisions of the Survey, other Federal and State agencies, industry or the general public. Many projects lead to one or more publications. Such undertakings as geologic quadrangle or strip mapping, investigations of the leasable mineral resources of an area, systematic inquiry into the water-power and reservoir storage potentials and dam sites of a river basin, examination of a petroleum reservoir, and other special studies may qualify as projects.

Submission

A project can be proposed by any member of the Conservation Division. After discussion of the project with the District or Area Supervisor, the objectives, justification, and other pertinent data are assembled on the enclosed form, "Geological Survey - Conservation Division Project Description." Six copies of the project description are submitted by the Area Supervisor to the Regional Conservation Manager who assigns a number beginning with the initial of the region, Eastern (E), Gulf of Mexico (G), Central (C), or Western (W), followed by an appropriate sequential number and ending with the year the project was initiated. For example, a project initiated

in the Central Region during the year 1975 and the sixty-ninth in the current listing of outstanding projects would be designated as C-69-75. After reviewing the project description and reconciling any differences of opinion he might have with the Area Supervisor, especially with regard to objectives, personnel and funds involved, the Regional Manager recommends the project to the Division Chief for approval. Upon approval, copies are distributed to:

Conservation Division Reston files
Geologic Division Program Office
Regional Manager
Area Supervisor
Project Chief
Chief, Branch of Mineral and Water Classification

An additional copy can be made for the District Supervisor when needed.

The enclosed form has been constructed to fit the needs of the Conservation Division. Use, no doubt, will reveal shortcomings and the form will have to be revised. Please submit any suggested additions, deletions or changes to the Chief, Branch of Mineral and Water Classification.

Progress Reports

Progress toward completion of each project is reported to the Division Chief and Regional Managers as follows:

1. Monthly: Summary Report on Active Projects by the Area Supervisor

2. Annually: Work Plan and Accomplishments (Form 9-1294, Rev. 8-74) by the project chief.

Active Projects

The Regional Manager will furnish an updated list of active projects in his region to the Chief, Conservation Division on or about January 1 of each year. Copies of this list will be furnished the Area Supervisors involved and the Chief, Branch of Mineral and Water Classification.

Miscellaneous

In his review of project descriptions, the Regional Manager should make certain that the proposed work is needed and that personnel and funds are available for timely completion. Work on projects should not be allowed to drag on as, for example, C-3-57, Utah Mineral Map and Cards, which was started in 1957. Once a project is approved it is the responsibility of the Regional Manager and Area Supervisor to push the project to completion. Additional project description forms can be obtained from the Chief, Branch of Mineral and Water Classification.

Russell G. Wayland

Chief, Conservation Division

Enclosure

Copies to: Distribution List attached
Asst. Div. Chief, Resource Evaluation
Asst. Div. Chief, Operations
Evaluation Standards & Publications Section
Chief, Branch of Mineral & Water Classification

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

In Reply Refer To:
Mail Stop 640

MAY 16 1977

Memorandum

To: Conservation Manager, Eastern Region
Central Region
Western Region
Gulf of Mexico OCS Operations
Area Geologists
Area Resource Evaluation Supervisors

From: Acting Chief, Conservation Division

Subject: Review of Geologic Division Project Proposals to Ensure Data Collection to Expedite Mineral Classification and Evaluation Programs

Enclosed please find:

(1) a copy of the Office of Survey and Review audit of 1971 - "Coordination on Mineral Land Classification Activities - Geological Survey,"

(2) the subsequent Memorandum of Understanding (MOU) between Geologic Division and Conservation Division of September 3, 1971, on cooperation in collection of basic geologic data for mineral land classification,

(3) our memo of March 28, 1977, suggesting revised procedures to coordinate implementation of the MOU, and

(4) the response of April 8, 1977, from the Chief Geologist implementing procedures for regional coordination of such efforts.

Please ensure that regional efforts to implement full coordination and cooperation with Geologic Division are successful in maximizing basic data acquisition in aid of our mineral classification and evaluation programs. Copies of all project proposal page 2a requests furnished to Geologic Division should be provided to Headquarters (MS 640) for information purposes. All data supplied as a result of such cooperative

efforts should be requested to be supplied directly to the appropriate Area head rather than the Branch of Mineral and Water Classification as indicated in the Chief Geologist's memorandum.

All personnel involved in the preparation or review of project proposals should be informed as to these revised procedures and the need for close coordination and cooperation to ensure not only lack of duplication of effort but also to ensure that the planning for all pertinent field data-gathering activities, whenever possible, will aid in yielding results useful for expediting both classification and evaluation programs.

Russell G. Wayland

Acting Chief, Conservation Division

Enclosures (4)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
Area Geologist's Office
345 Middlefield Road
Menlo Park, California 94025

May 4, 1977

Memorandum

To: Acting Conservation Manager, Western Region

From: Area Geologist, Pacific Area

Subject: Project description of oil shale, Elko County, Nevada

The project description for "Investigation of oil shale of Tertiary age, Elko, Nevada" is attached for your approval and transmittal to Reston.

Henry L. Cullins

Henry L. Cullins

U.S. Department of the Interior
GEOLOGICAL SURVEY - CONSERVATION DIVISION

PROJECT DESCRIPTION

ECT NUMBER (To be assigned by Regional Office) W-4-77	FORM PREPARED BY Stanley Sun and Barry Solomon
JECT TITLE Investigation of oil shale of Tertiary age, Elko County, Nevada	PROJECT CHIEF AND HEADQUARTERS Stanley Sun, Menlo Park
ION Western Region	PROPOSED STARTING DATE (month and year) June 1977
A Pacific Area	ESTIMATED COMPLETION DATE - FIELD WORK September 1979
TRICT	ESTIMATED COMPLETION DATE - REPORTS September 1980

ALUATION OF FEDERAL LANDS
LEASABLE COMMODITIES PRESENT
Asphaltic Material [ ] Coal [ ] Geothermal Resources [ ] Oil and gas [ ]
Oil Shale [X] Phosphate [ ] Potassium [ ] Sodium [ ] Sulfur [ ]
Locatable minerals on acquired lands [ ]

CLASSIFICATION INFORMATION

Withdrawals (dates and townships) July 1968 — T. 33-34 N., R. 54 E.; T. 33-35 N., R. 55 E.; T. 33-35 N., R. 56 E., M.D. M.

Known leasing areas (commodity, date and townships) None

Other None

DATA NEEDED (Depth, thickness, extent, quality, resources, etc.)

Geologic map of the area surrounding three trench sites on a scale of 1:12,000, showing detailed structural and stratigraphic relationship of oil shale deposits and surrounding country rocks. Quantity, quality, thickness, and extent of the oil shale occurrences can be derived from detailed mapping. Measured sections, and petrographic and chemical analyses will be necessary to provide additional information. Sampling program and reconnaissance of the remainder of the withdrawal, as well as drilling and/or trenching as necessary to complete data gaps.

OBJECTIVES
Quadrangle mapping [ ] Strip mapping [X] Drilling [X?] Geophysical investigations [ ]
Other Trenching?

Acquire detailed information where the Elko Formation crops out at the surface (3 locations in and near area of withdrawal), and extrapolate the data to provide an estimate of oil shale distribution throughout the withdrawal. Document stratigraphic and structural features that may affect mining, and assess the potential geologic hazards. Open-File publication of maps, and restoration and classification of oil shale lands will be made.

JUSTIFICATION (Why project should be undertaken; how it fits into Conservation Division overall program)

Previous investigations have been too general to contribute to an accurate estimation of oil shale resources and reserves. Detailed stratigraphic and structural information is essential to adequately evaluate the oil shale resources of the Elko Formation. Our assigned mission of classification, evaluation and providing geologic reports for prospecting permits, lease applications, mining plan reviews, and geologic hazard studies requires detailed geologic data.

ER COMMODITIES
OMMODITIES KNOWN OR SUSPECTED

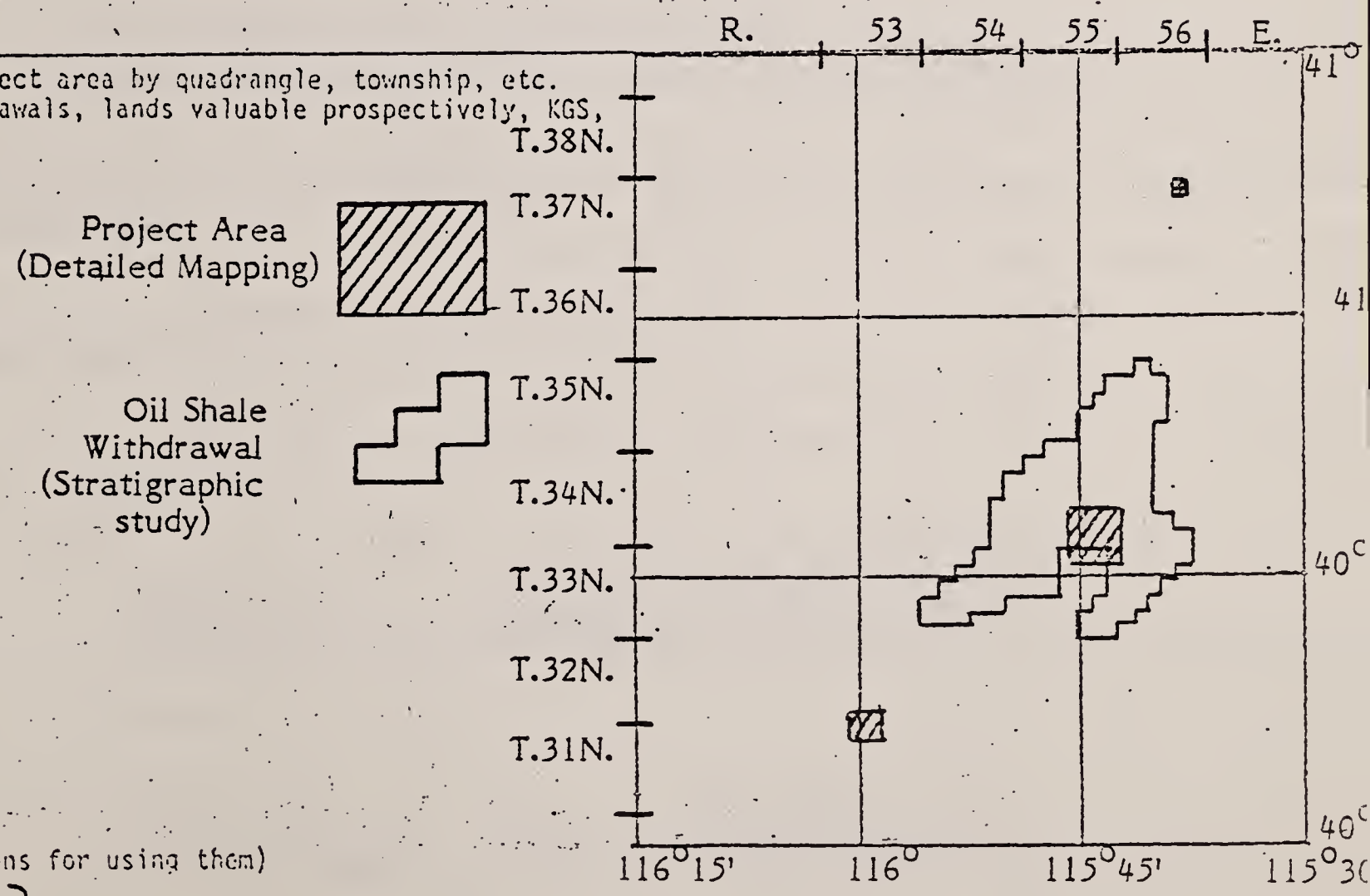
Coal (valuable prospectively), oil and gas (valuable prospectively), geothermal (Elko Hot Spring KGRA and valuable prospectively), phosphate (valuable prospectively, but not within oil shale withdrawal).

ATA NEEDED (cite material and townships)

HODS OF STUDY

1. Mapping of oil shale occurrences at three localities at a scale of 1:12,000, using topographic map bases and air photos.
2. Measuring sections and collecting samples, both within the three localities noted above, as well as within the remainder of the withdrawal.
3. Drilling and/or trenching as necessary to complete data gaps.
4. Chemical, petrographic, and fossil analyses.
5. Compilation of field data and preparation of final maps.

ECT LOCATION (Outline project area by quadrangle, township, etc. show relationship to withdrawals, lands valuable prospectively, KGS, A, and KLA's.



SCALES (Give scales and reasons for using them)

ELD WORK	1:12,000	necessary for detailed delineation of oil shale;
PILATION	1:12,000	
PLICATION	1:12,000	2x magnification of available topographic coverage.

SE MAPS
available 1:24,000 Coal Mine Basin, Buttes, Elko East, and Elko West topo maps; 1:62,500 Carlin and Dixie Flats topo maps.

eded 2x blow-ups of portions of the quads noted above.

IPMENT AND LABORATORY FACILITIES
available Microscope for thin section analysis.

eeded

TICIPATION BY OTHER GEOLOGICAL SURVEY UNITS (mapping, analyses, fossil identification, thin sections, etc.)

NIT	TYPE OF SUPPORT	ESTIMATED NUMBER SAMPLES OR COLLECTION
Geologic Division	thin sections, chemical analyses, fossil identification	30-50 thin section
EROS Data Center	air photos	

PERATIVE ARRANGEMENTS WITH OTHER AGENCIES AND INDUSTRY (mapping, analyses, etc.)

RGANIZATION	SUPPORT FACILITIES	FUNDS

NS FOR REPORTS

rofessional Paper		Geol. Quad. Map (GQ)		Geophysical Inv. (GP)		River Survey	
ulletin		Misc. Inv. Map (I)		Oil and Gas Map (OM)		Technical Journals	
ater Supply Paper		Misc. Field Studies (MF)		Oil and Gas Chart (OC)		Open-file report	X
ircular		Min. Inv. Resources (MR)		Coal Map (C)		Administrative report	
ournal of Research						Outside Publication	

FFIC PLANS

One geologist -- half time each fiscal year.
One physical science technician -- half time each fiscal year.

ANCIAL PLANS See attached sheet

	FISCAL YEAR			Total estimated cost:
laries, travel, and supplies	$	$	$	
ecial equipment and other capital outlay	$	$	$	
TOTAL	$	$	$	$

Submitted.

5/4/77 (Date) Henry L. Gulliford Area Supervisor

Reviewed.

5/6/77 (Date) Acting Regional Conservation Manager

Approved.

5-20-77 (Date) Acting Robert E. Reavis Chief, Conservation Division

FINANCIAL PLANS

	FY 77	FY 78	FY 79	MAN YRS.
Salaries				
1 geologist (8 wks. field & 16 wks. office)	$9,500	$9,500	$9,500	12/8
1 Phy. Sci. Tech. (8 wks. field and 16 wks. office)	4,300	4,300	4,300	12/8
Travel (1 vehicle)	400	400	400	
Per Diem* (2 people, 8 wks.)	2,380	2,380	2,380	
Air photos	50			
Base map preparation	200			
Thin sections			250	
Drilling and/or trenching (as needed)			5,000	
Chemical analyses			2,000	
Field equipment	200			
TOTALS	$17,030	$16,580	$23,830	3

TOTAL ESTIMATED PROJECT COST: $57,440

* 1st week: $30/day, 2-8th week: $20/day

United States Department of the Interior

U.S. Geological Survey

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

RECEIVED
MAY 31 1977

In Reply Refer To:
Mail Stop 640 Division
Western Region
Menlo Park, Calif.

MAY 27 1977

Memorandum

To: Conservation Manager, Western Region

From: Acting Chief, Conservation Division

Subject: Project Description (W-4-77)

The enclosed Project Description has been approved by this office. The original and two copies are being returned to you, the original for your files and a copy each for the Area office and Project Chief.

John Dulitsky
Acting Chief, Conservation Division

Enclosures

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

May 31, 1977

Memorandum

To: Area Geologist, Pacific Area

From: Acting Conservation Manager, Western Region

Subject: Programs and Plans -- Approval of Elko Oil Shale Project (W-4-77)

Attached is Division approval for the "Investigation of Oil Shale of Tertiary Age, Elko County, Nevada (W-4-77). Please proceed with the project and submit a monitored objective that describes the steps necessary and timetable for successful completion of the project.

Lowell G. Hammons

Lowell G. Hammons

Enclosure

(Gov. Proc. Reg. (41 CFR) 1-3.605-5)

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MARK ALL PACKAGES AND PAPERS WITH ORDER AND/OR CONTRACT NUMBERS

1 OF 1

DATE OF ORDER

CONTRACT NO. (If any) N/A Open Market

ORDER NO. 83608

ISSUING OFFICE Leadore, Idaho

REQUISITIONING OFFICE Area Geologist Office

ACCOUNTING AND APPROPRIATION DATA 7-6416-90090

REQUISITION NO./PURCHASE AUTHORITY H. Cullins

CONTRACTOR (Name and address, including ZIP code)

Quinton Snook
Route 1, Box 49
Salmon, Idaho 83467

SHIP TO (Consignee and address, including ZIP code)

U.S. Geological Survey
Conservation Division
345 Middlefield Road
Menlo Park, California 94025

Attn: Arthur G. Berg
415-323-8111, Ext. 2716

VIA

TYPE OF ORDER

PURCHASE [X] DELIVERY [ ]

PLEASE FURNISH THE FOLLOWING ON THE TERMS SPECIFIED ON BOTH SIDES OF THIS ORDER AND ON THE ATTACHED SHEETS, IF ANY, INCLUDING DELIVERY AS INDICATED. THIS PURCHASE IS NEGOTIATED UNDER AUTHORITY OF REFERENCE YOUR

EXCEPT FOR THE BILLING INSTRUCTIONS ON THE REVERSE, THIS DELIVERY ORDER IS SUBJECT TO INSTRUCTIONS CONTAINED ON THIS SIDE ONLY OF THIS FORM AND IS ISSUED SUBJECT TO THE TERMS AND CONDITIONS OF THE ABOVE NUMBERED CONTRACT.

F. O. B. POINT N.A.

GOVERNMENT B./L. NO. N.A.

DELIVERY TO F.O.B. POINT ON OR BEFORE N.A.

DISCOUNT TERMS Net 30 Days

ITEM NO.	SUPPLIES OR SERVICES	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT
	Services: Dig 1 phosphate trench using caterpillar type dozer, D-7 or equivalent for period 8/15/77 through 8/26/77				
	Equipment - D-7		hour	$39.00	
	Mileage*		mile	$2.25	
	*No charge for mileage if contract time exceeds 40 hours.				
	EXAMPLE				
	Total not to exceed $2,500.00				
		Estimated cost including trenching, reseeding and mileage is			$1,800.00

TOTAL →

INSTRUCTION TO SELLER: Prepare invoice in triplicate, itemizing fully, preferably your own invoice forms or Standard Form 1034, referring thereon to this purchase order number.

SEND INVOICE TO: U. S. Geological Survey, Branch of Financial Management, Washington, D. C., 20244.

Signature [signature]

Title Acting Conservation Manager, WR

Date July 1, 1977

ORIGINAL SELLER'S COPY

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

MEMORANDUM

April 8, 1977

TO: Regional Geologists

FROM: Chief Geologist

SUBJECT: Cooperation in collection of geologic data for Mineral Land Classification

Recently it was brought to my attention that we are not writing project proposals according to the procedures set forth by the Memorandum of Agreement, dated September 3, 1971, between the Conservation Division and Geologic Division. The project chiefs of all projects proposed for new geologic mapping on Federal Lands will be responsible for supplying certain data, if needed, to the Branch of Mineral and Water Classification for evaluation of Federal Lands. Geologic data on Federal Lands may be needed for the following commodities: coal, oil and gas, oil shale, geothermal resources, and phosphate, potassium, and sodium minerals. To best implement this requirement, I suggest that the Regional Geologists contact the Regional Conservation Managers directly while the project description is being formulated so that Conservation Division personnel may indicate on page 2a of the Project Description (form 9-1241) what land classification is needed. Your approval of the proposed project should be made after establishing whether or not page 2a should be included and after establishing the necessary coordination with the appropriate State Geologist and/or State Survey.

The Memorandum of Agreement also indicates that any funds required to meet special expenses involved in sampling, such as trenching, drilling, and chemical analysis, will be transferred or otherwise borne by the Conservation Division. This applies to only those expenses resulting from Conservation Division's requests that are not included in the project objectives and budget.

Richard P. Sheldon

cc: Office Chiefs
Branch Chiefs
Regional Conservation Managers

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

FEB 28 1975

Memorandum

To: All Personnel, Geologic Division

From: Chief Geologist

Subject: Change in prices for analytical services

An adjustment in the funding mechanism for the Branch of Analytical Laboratories makes possible a reduction in the charges for all analytical services provided by the Branch. Therefore, retroactive to the beginning of FY 75, all prices for analytical services are being reduced by approximately one-third. Work previously submitted in FY 75, even if already completed, will be reduced in cost by exactly one-third, and the Branch accounts will receive credit for the difference. That sum will remain with the Branch of Analytical Laboratories, and can be used only for your additional analytical work this fiscal year.

A revised price schedule for all analytical services is enclosed, and it is anticipated that these new prices will continue in effect in FY 76 with no substantial changes.

Dick

Richard P. Sheldon

Enclosure

February 24, 1975
(Revised)

Schedule of Charges for Analytical Services
Branch of Analytical Laboratories

Thin sections	
Standard	$2.30/section
Oversize	4.70/section
Polished sections	3.30/section
Staining of thin or polished sections	1.30/element
Polishing chip remaining from thin section	1.00/chip
Polishing thin sections or thinning pol. sec.	6.70/sample
X-ray	
Quantitative, 10 major rock-forming elements (aluminum, calcium, total iron, magnesium, manganese, phosphorus, potassium, silicon, sodium, titanium)	38.00/sample (M, R)
Quantitative, partial, specific elements (add $15.00 for sample preparation)	2.00/element
Quantitative, routine, trace elements (add $7.00 for sample preparation)	2.00/element
Semiquant, 11 major rock-forming elements (as above without sodium, but include chlorine & sulfur)	6.70/sample (D)
Selenium	6.70/determination (D)
Total spectral scan	8.00/sample
Non-routine determinations	(negotiated)
Electron microscopy	
Scanning	(no charge)
Transmission	20.00/hour; 1.00/photo (R
Electron probe	20.00/hour (R)
Computer reduction of data	3.30/hour of probe time
Optical emission spectroscopy	
Routine quantitative (charge made only for detectable and reportable amounts)	3.30/determination; 17.00/sample, minimum
Semi-quantitative	20.00/sample
Non-routine quantitative	(negotiated)
Neutron activation	
Group separation (10 rare-earth elements)	133.00/sample
Radiochemistry (routine)	33.00/element
INAA (20-25 elements)	50.00/sample
INAA (single element)	10.00/determination
U by fission track	10.00/sample (D)
Direct oxygen	6.70/sample (D)
Delayed neutron (U and Th)	6.70/sample (D)
(U or Th)	4.00/determination

Element		Charge	Comments
Cadmium		$ 6.70	AAS
Carbon	Organic	6.70	
	Inorganic	6.70	13.40 for all three
	Total	6.70	
Cesium		10.00	AAS, preconcentration
Chlorine		10.00	Spectrophotometric
Chromium		10.00	Spectrophotometric
Cobalt		10.00	AAS, or spectrophotometric
Copper		6.70	AAS
Fluorine		10.00	Ion-sensitive electrode
Gold		13.00	Fire Assay-AAS (D, R)
Indium		10.00	Substoichiometric-ID (R)
Lead (<25 ppm)		47.00	Special reagents; separations
Lead (>25 ppm)		6.70	AAS (D)
Lithium		6.70	AAS
Mercury		10.00	AAS, Flameless (D, R)
Molybdenum		6.70	Spectrophotometric-ID (R)
Nickel		6.70	AAS
Niobium		10.00	Spectrophotometric-ID (R)
Phosphorus		10.00	Volumetric or gravimetric
Rubidium		6.70	AAS (D, R)
Selenium		10.00	Spectrofluorometric (D, R)
Silver		6.70	AAS or radio-reagent ID (R)
Silver and gold		17.00	Fire Assay-AAS) (D, R)
Strontium		6.70	AAS
Sulfur		10.00	Combustion (D)
Tantalum		10.00	Extraction-spectrophotometric (D, R)
Thallium		10.00	Spectrofluorometric (D, R)
Thorium		47.00	Spectrophotometric (preconcentration special reagents) (D, R)
Tin		17.00	Spectrophotometric (X-ray fluorometric) (D, R)
Tungsten		6.70	Spectrophotometric ID (D, R)

Conventional rock analysis
(14 elements + F, Cl if requested) 200.00/sample (D)

Rapid rock analysis
Complete (14 elements) 67.00/sample (R)
Partial (add $16.00 for sample decomposition)
aluminum, iron (total), phosphorus, silicon, titanium 1.30/determination
calcium, potassium, magnesium, manganese, sodium 2.70/determination
(those below include sample decomposition)
carbon dioxide, iron (ferrous), H_2O- 6.70/determination
H_2O+ 9.70/determination

Partial chemical analysis
Rock forming elements
(add $3.30 for sample decomposition)

Element	Charge	Comments
Aluminum and silicon	$17.00	Spectrophotometric
Calcium	3.30	AAS
Iron (Total)	3.30	Spectrophotometric or AAS
Magnesium	3.30	AAS
Manganese	3.30	AAS
Potassium	3.30	AAS
Sodium	3.30	AAS
Potassium and/or Sodium	3.30	IL Flame Photometer
Titanium	6.70	Spectrophotometric
Iron (ferrous)	10.00	Volumetric (includes separate decomposition)

Minor and trace elements
(Charges for the following include appropriate sample decomposition. Lower charges may be made for large-scale or for multi-element studies)

Element	Charge	Comments
Antimony	$13.00	Spectrophotometric
Arsenic	10.00	Evolution-spectrophotometric
Barium	10.00	AAS
Beryllium	10.00	Spectrofluorometric
Bismuth	6.70	Spectrophotometric-isotope dilution (R)

Element	Charge	Comments
Equiv. Uranium	$ 1.30	Counting (D, R)
Uranium	6.70	Fluorometric (D)
Uranium	17.00	Volumetric
Vanadium	10.00	Spectrophotometric
Zinc	6.70	AAS

Miscellaneous determinations

H_2O (Total)	8.00	Penfield
	10.00	Moisture analyzer (M)
H_2O-	2.70	
Palladium, Platinum, Rhodium (SQ spect. required if not available)	100.00	Fire assay-spectrographic (D) or Fire assay-AAS (R)
Ash	2.00	
Loss on ignition	1.30	
pH	1.30	
Fischer oil assay	10.00	(D)
Acid-insoluble residue	2.70	
Powder density or specific gravity	4.00	Small samples (R)
Bulk density	5.30	
F or S (Total)	4.00	
Grinding only (no analytical work requested)	2.00	

Charges for the following are subject to negotiation depending on complexity of sample and amount available for analysis:

Mineral analysis	Small samples (R)
Peat testing	(R)

Note:

(R) Available at Reston laboratory only.
(D) Available at Denver laboratory only.
(M) Available at Menlo Park laboratory only.

FORM 9-1403
(REV. 3-1966)

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

REQUEST FOR SECTIONS

Page ____ of _____ pages

Prepare original and 3 carbons. Enclose one copy with samples. Send others to laboratory.

SUBMITTED BY *(Print or type name and address)*

Date: *Tel. Ext.*

NO. SAMPLES

DATE NEEDED

JOB NO. *(Lab.)*

Project No. and Title:

Approved by: *Branch Chief*

Subdivision or organization:

WORK REQUESTED: T-Thin sections; P-Polished sections; X-Other *(specify)*

LAB USE	FIELD NO.	ROCK OR MINERAL NAME OR DESCRIPTION	COUNTY AND STATE	WORK REQUESTED
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

PLEASE LIST NO MORE THAN TWENTY SAMPLES PER PAGE

Note

The coding scheme used for submitting samples to the Branch of Analytical Laboratories, as presented in this third edition of the manual, is not compatible with the scheme given in the second edition. In cases where large numbers of samples have been coded according to the scheme in the second edition, the submitter may wish to continue using the second edition for the duration of that project.

Data Processing Group

The Data Processing Group referred to on this manual is an informal unit within the Branch of Geochemical Census. Please contact Roy V. Mendes, Federal Center, Bldg. 25, Denver, Colorado (Phone: 303-233-3611, ext. 6568).

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CONTENTS

Preface

Research in the development of methods for information exchange in the geological sciences, including the development of machine techniques for the storage and retrieval of geologic data, is a subject of increasing concern throughout the geologic profession. A great deal of work on the subject is being done within industry, universities, and government. The development of procedures for storing geochemical data in a useable form is only a small part of this broader problem, but it too is still in the research stage. It would be self-defeating to think that either our present system or systems we have used in the past are perfected and can remain unchanged. We hope that this third edition of the "Sample Submittal Manual" will be received in this spirit.

The benefits to be derived from a machine system for storing and retrieving geochemical data are of two kinds--benefits to the project that supplied the samples, and benefits to other projects at a later time. The project that supplied the samples benefits by having the resultant data available in a form such that they can be selectively retrieved and automatically entered into a system of computer programs that will save the drudgery of data handling, thereby allowing more time for professional tasks. The benefits to other projects at a later time cannot be fully anticipated, but some likely examples are retrieval of data on specific geographic areas of interest to learn what data are available, retrieval of data on various geologic materials as an aid in formulating research problems, and retrieval of data and identification of materials meeting certain compositional specifications, especially in commodity studies.

We have observed that coding schemes being devised for describing geologic materials by other organizations are a great deal more comprehensive than either the one used in the first and second editions of this manual or the ones presented in this third edition. Indeed, the ones given in this edition are less comprehensive than those we have used previously. This results both from experience gained over the past 5 years allowing us to sort out better that part of the scheme which may be useful and that which seems less so, and from a gradual change in coding philosophy. While the more complete a coding scheme is the more useful it will be, we have come to realize that it may be better to have less information about the materials analyzed but to have this accurately and consistently.

The principal changes in the coding scheme introduced with this third edition are simplifications, primarily in coding descriptive information on sedimentary rocks and mineral deposits. Significant changes have been made in the methods for coding information on soils, metamorphic rocks, and unconsolidated sediments. Also, recognizing the fact that the need frequently arises for special purpose coding schemes for use within individual projects, we have set aside "free" space for such codes within the system.

Other changes from earlier editions consist of explanations of the total data system--RASS and STATPAC--and of procedures for their use.

Finally, the manual now includes procedures for submitting samples to laboratories of the Field Services Section of the Branch of Exploration Research in work pertaining to the Wilderness, Heavy Metals, Marine Geology and other programs.

INTRODUCTION

The purpose of this manual and the standardized sample submittal forms is to provide a means for supplying uniform descriptive information pertaining to rock samples and other materials submitted for analysis. The information will be stored in a computer-based file, along with the laboratory data resulting from the analyses, in such a way that it can be readily retrieved and tabulated or automatically prepared for further computer processing. This might be done in behalf of the geologist who originally submitted the samples for analysis, or in support of other geochemical studies as may be meaningful and appropriate. The data to be retrieved may be selected according to sample number, project number, geographic area, name of submitter, or according to other types of information, including coded sample descriptions, recorded on the sample submittal forms; they may also be selected on the basis of chemical properties of the samples as indicated by the analytical data.

From 1962 through 1967, data from the Branch of Analytical Laboratories and coded descriptive information on the samples analyzed were recorded on standard 80-column punch cards, and stored in a card file. Retrieval of data from the file, referred to as the Pre-68 Card File, is made by means of a card sorter. A computer-based file was initiated on January 1, 1968; data and descriptive information on samples submitted after this date are presently entered on magnetic tapes and retrieved by means of computer processing techniques. The computer-based file is referred to as RASS (Rock Analysis Storage System).

An overall view of the data processing system is diagrammed on figure 1. The components of the system are lettered A through J.

Component A (fig. 1) is the Pre-68 Card File of data on standard 80-column cards accumulated during the period 1962 through 1967. Retrievals from the card file are made by means of a card sorter (Component B), and entry of the retrieved data into the computer for further processing is done by special purpose programming (Component C). Because of the special programming required, preparation of data from the Pre-68 Card File for computer processing will be done only in support of high priority investigations. Retrievals and listings of the selected data from the card file, however, can be accomplished routinely. (See page 43 for instructions on requesting retrievals of data on samples submitted prior to 1968.)

Component D (fig. 1) is the principal RASS file containing the descriptive information and the analytical data on samples submitted to the Branch of Analytical Laboratories after January 1, 1968, and information and data on samples submitted to the Field Services Section Laboratories by certain projects. Analytical data may be selectively retrieved from the file and entered automatically on to a magnetic tape or disk (Component E) in a specific standardized format. Components E through J (fig. 1) make up the STATPAC system, and Component E is generally referred to as a STATPAC tape. The STATPAC tape is the central component of the system for computer processing of geochemical data. Once data are placed on a STATPAC tape, they may be processed through any of the computer programs in the STATPAC

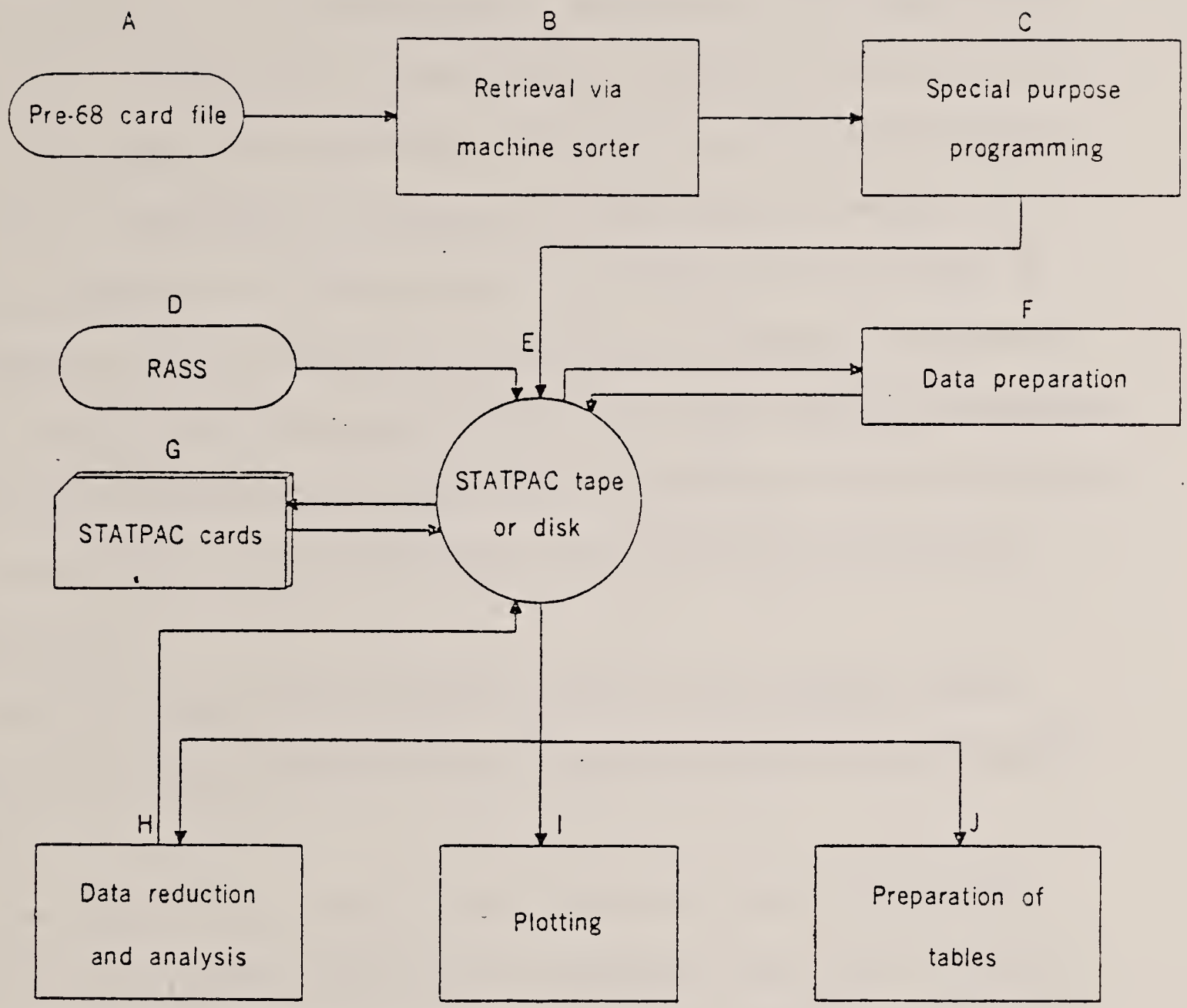

Figure 1.--Geochemical data processing system.

system. Moreover, the results of many types of computations provided by the STATPAC system can be automatically returned to a STATPAC tape for further processing. The programs in the STATPAC system include facilities for: 1) preparation of data (Component F) such as logarithmic or other kinds of data transformations, averaging of replicate samples or analyses, recalculation of analyses; 2) transfer of data to a card deck at any stage of the processing (Component G); 3) data reduction and analysis (Component H) including the computation of means, etc., and the preparation of histograms and contingency tables as well as data analysis by such techniques as analysis of variance, regression, factor analysis, and discriminant analysis; 4) data plotting (Component I) including simple plots of analytical values on maps and/or contouring; and 5) preparation of data tables for open-file type publications (Component J).

Refer to program documentations issued by the Computer Center Division for further descriptions of computer programs in the STATPAC system.

The coding scheme given in this manual for use in submitting samples to the Branch of Analytical Laboratories was first developed by several panels of specialists within the U.S. Geological Survey, and after a 5-year trial period was modified as a cooperative effort by several Branch of Geochemical Census personnel. A different coding scheme, developed in cooperation with the Branch of Exploration Research, is used for submitting samples to the Field Services Laboratories.

Two points regarding the coding schemes are emphasized:

1. The coding schemes are used in an attempt to provide consistent descriptive information on the wide variety of types of samples submitted for analysis. They will not necessarily be the best schemes that could be used for any particular sample suite.
2. The coding schemes include, for the most part, only characteristics of the samples that can be observed in the hand specimens or at the immediate sample locality. For many specimens or localities, however, the characteristics will not be observable and the coding will necessarily be incomplete. You are requested to code only those characteristics that are known at the time the samples are submitted for analysis. Any additional information or corrections you care to submit at a later time, however, can be entered into the system.

Suggestions for improvements in the coding schemes, consistent with the two points referred to above, and questions regarding the coding schemes or any other aspect of the data processing system should be addressed to the Data Processing Group.

INSTRUCTIONS FOR SUBMITTING SAMPLES TO THE BRANCH OF ANALYTICAL LABORATORIES

General

A copy of the "Coding Sheet and Request for Analysis" form to use in submitting samples to the Branch of Analytical Laboratories is shown on page 7. The instructions given here pertain only to the completion of this form. Before this is done, the request should be discussed with a Branch of Analytical Laboratories representative if it will involve either large numbers of samples or any laboratory work other than the most routine kinds. The samples and forms should be submitted to the Branch of Analytical Laboratories "Sample Control Representative" in either Washington, Denver, or Menlo Park.

The normal paths of the samples, the Coding Sheet and Request for Analysis forms, and the analytical data through the "mill" are shown on figure 2.

Coding Sheet and Request for Analysis Form

The "Coding Sheet and Request for Analysis" forms, comprised of front and continuation sheets, are made up in tablets consisting of an original sheet followed by 5 sheets of pressure-sensitive paper that make copies without carbons. Spaces are provided on the front sheet for information concerning the group of samples submitted. The remainder of the front sheet and the continuation sheets are used for descriptions of individual samples. When samples are submitted, an original plus four copies should be transmitted to the Branch of Analytical Laboratories. The fifth copy is retained by the submitter.

Example
Submitted by: John Smith
U.S. Geological Survey
Address: Washington, D.C.

Collected by: (if other than submitter)

Paul Jones

Release code A - Jan., 1972

Send carbon of report to:
Paul Jones
U.S. Geological Survey
Denver Federal Center

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CODING SHEET AND REQUEST FOR ANALYSIS

Page 1 of 1 pages	Total No. of Samples 5	LABORATORY USE ONLY
Date Submitted: 1-25-69	Date Results Needed: 7-1-69	Report No.
Subdivision & Branch: Experimental Geology / Geochemical Census		Report Date:
Project Title: Miscellaneous Investigations		Job No.
Project No. 976070	Lot No.	Lab. Comment:
Approved by: (Branch Chief or Representative)		

Work Requested:
(List elements for partial anal.)

Rapid Rock Anal.
Quant. Chem. for Ba, Sr, Be, Th, & Zr.

Others: See Comments

PREVIOUS WORK DONE

Report No.	Type of analysis
66WS-7	Semiquant. spec.

Assigned Lab. No.	FIELD NO.	S.E. Corner-7½' Quad. LAT.	LONG.	STATE	COUNTY	FORMATION	SAMPLE NAME & DESCRIPTION
D101542	PJ-65-1	35°52'	111°30'	Ariz.	Coconino		Meteorite fragment
COMMENT:							
D101549	PJ-65-12	40°00'	105°30'	Colo.	Boulder	Boulder Ck. Granite	Biotitic quartz monzonite
COMMENT: This sample is highly weathered							
D101565	PJ-65-85	39°15'	115°00'	Nev.	White Pine	Chainman Shale	Altered shale-adjac. to vein
COMMENT: Some pyrite is present							
D101586	PJ-65-137	14°45'	120°22'E	Phillippine Is.			Equisetum (scouringrush)
COMMENT:							
D125609	PJ-64-203	45°30'	112°15'	Mont.	Madison		Heavy mineral concentrate
COMMENT: Quant. Chem: Nb, Ta, Ce, La							

Assigned Lab. No.	11	12	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30	35	36	37	38	39	70	71	72	73	74	75
D101542	T	C	J					J	T																					
D101549	T	D	A	B				A	M	Q	C	N																		
D101565	T	H	F	I			E	C	C	S		A																		
D101586	T	A						H	4	1	4	2	2	5	A	R	E	Q	U	O	2	5	5							
D125609	T	J	A	Y				D	2			A																		

INSTRUCTIONS: Prepare original plus 5 copies of this form: keep 1 copy; enclose 1 copy with samples; send original and 3 copies with memo to Laboratory. Do not mark in unnumbered boxes. Receipt of samples will be acknowledged.

Date Received _____ Estimated date of Completion _____ Signed _____
Liason Officer

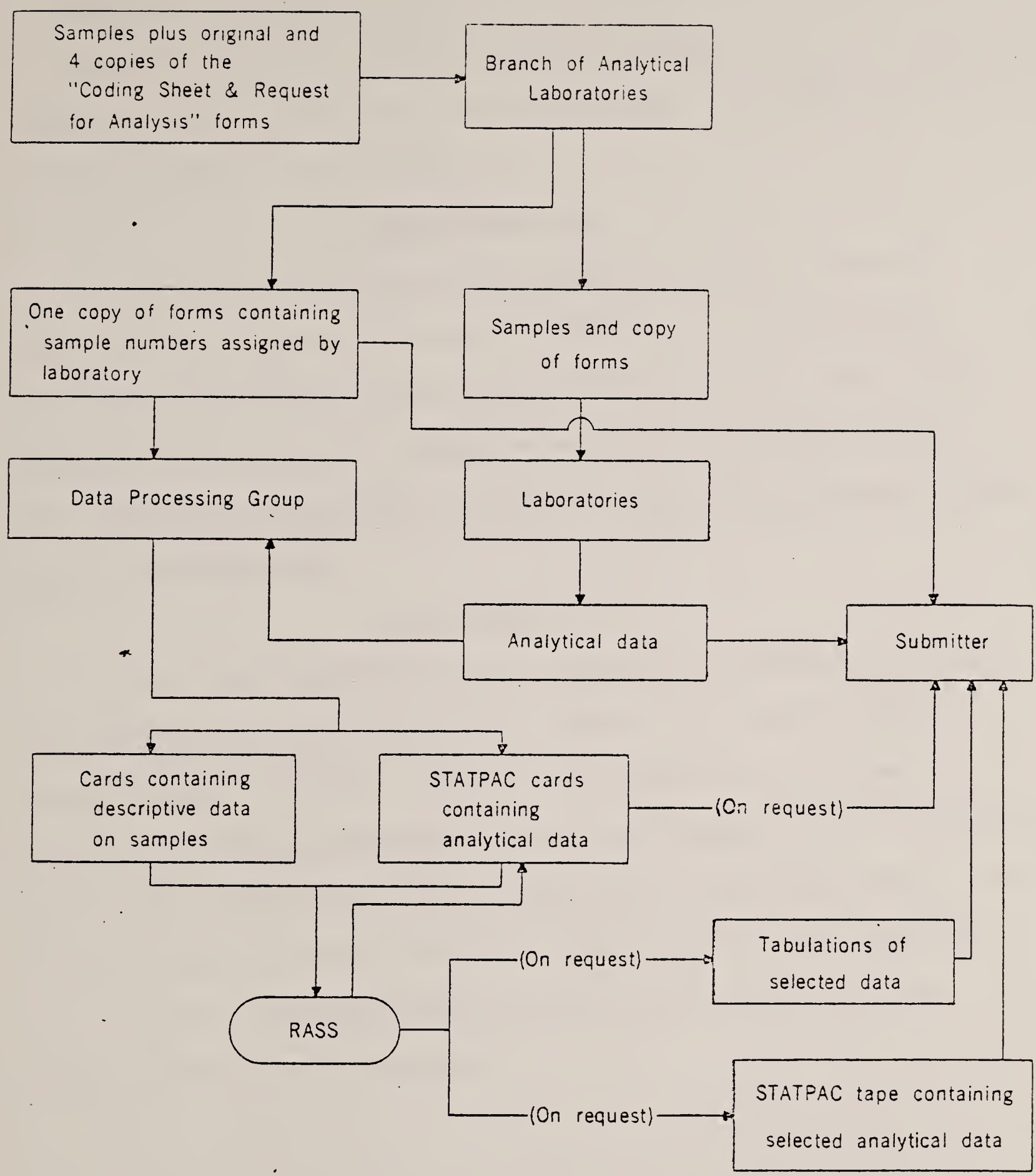

Figure 2.--Diagram showing organization of procedure for processing data from the Branch of Analytical Laboratories.

General information is requested at the top of the front sheet. The caption "Page 1 of __ Pages" refers to the total number of original (front sheet plus continuation) sheets submitted; continuation sheets should be numbered consecutively.

Data release code

The memorandum from the Chief Geologist regarding "Release of Analytical Data" reproduced on page 10 explains the system used in protecting the submitter against premature release of the data. The "release code" is for your protection and should be supplied if you wish any special precautions to be taken in restricting the distribution of the analytical data.

Work requested

In the "Work Requested" box, all types of spectrographic, chemical and physical properties analyses to be made on the entire suite of samples should be listed. If additional analyses are to be made on a few of the samples submitted, "Others: See Comments" should be written in the work requested box, and the additional analyses specified in the "Comment" boxes under the appropriate sample numbers. You are urged to discuss the work to be requested with a representative of the Branch of Analytical Laboratories.

C O P Y

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

February 26, 1968

Memorandum

To: All professionals, Geologic Division

From: Chief Geologist

Subject: Release of Analytical Data

During the past 5 years, nearly all data generated by the Branch of Analytical Laboratories have been routinely entered into a card-based automatic data storage and retrieval system maintained by the Branch of Geochemical Census. One of the primary purposes in setting up the system was to establish a mechanism whereby data obtained for one purpose could be made available for others. To protect the original submitter against improper or premature release of data, it was stipulated that no release be made without his knowledge and permission. This has proved somewhat impractical, so a modified plan is being adopted.

In the future, for all samples to either the Branch of Analytical Laboratories or to the Field Services Laboratories of the Branch of Exploration Research, submitters will be asked to specify a "data release" code in the upper left-hand corner of their "Coding Sheet and Request for Analysis" form, and to list a date after which the data can be released without restriction. The codes are as follows:

A indicates that the analytical data may be released only to agencies of the U.S. Government.

B indicates that the data may be released only to people within the Survey.

C indicates that the data may be released only to the submitter.

The notation "B-Jan., 1972" in the upper left-hand corner of the analytical request form, for example, indicates that the submitter wishes the data to remain within the Survey until January of 1972. After this date it may be made available to anyone. Release codes and dates may be added or revised at any time on request by the submitter. If no release code is specified on the analytical request form, we will assume that, so far as the submitter is concerned, the data may be released to anyone.

/S/
Harold L. James

Requests for other "analytical services," such as preparation of thin and polished sections, should continue to be made on the forms now in use for these services.

Previous work done

The box headed "Previous Work Done" is to be filled in only if the entire suite of samples is being resubmitted for additional work. If some, but not all, of the samples are resubmittals, this information should be entered in the "Comments" box on the left side of the sheet under the appropriate sample number.

Sample description boxes

Each sample submitted is allocated a row of spaces headed consecutively: Assigned Lab No., Field No., Lat., Long., State, County, Formation, Sample Name and Description, together with a row of smaller numbered boxes beneath. Information in the top row of spaces is written out; information in the numbered boxes is coded.

Sample number

The Assigned Lab No. space on the left should be left blank for all new samples, but should be filled in for all resubmittals. Field No. refers to the sample identification number assigned by the sample collector or submitter.

Latitude and longitude

The latitude and longitude should be given in whole degrees and minutes, or in degrees, minutes, and seconds--not fractions thereof. Please ignore the reference to "SE Corner - 7½' Quad." on the Request for Analysis form (page 7). The latitude and longitude values can be transferred to a STATPAC tape with the analytical data to facilitate

automatic plotting of geochemical maps. If automatic plotting is planned, it is suggested that the latitude and longitude be given to the nearest second, or at least to a precision consistent with the scale to be used in the plotting. If automatic plotting is not planned, give latitude and longitude in degrees and minutes. (It will be convenient in many cases to provide the same approximate latitude and longitude for a large group of samples collected within one small area if automatic plotting is not planned.) North latitude and west longitude will be assumed unless otherwise noted.

State and County

State and county are written in the indicated fields by the submitter; state names may be abbreviated. For samples from Alaska, enter the name of the 2 degree AMS quadrangle in the field for county. Oceanographic samples should be designated "marine" in the county field. The name of the country should be written in the state and county fields for all samples from foreign countries except the following: Argentina, Australia, Brazil, Canada, China (mainland), India, Indonesia, Mexico, and Russia. For these nine countries, the name of the state or province should be given in addition to the name of the country.

Formation

The field for Formation should be filled in with the name of the stratigraphic unit, of formational rank or higher, represented by rock or mineral samples from the United States, Canada or Mexico. If the sample represents a named body of igneous rock, this name should be entered under Formation.

Sample Name and Description

The sample name and description field may contain the name of the sample material plus any descriptive modifiers. Use of this

field on the submittal form is especially important where the coding scheme does not provide an adequate description of the sample.

Comments

Additional information on individual samples can be placed in the spaces labeled "Comments" to the left of the numbered rows of boxes. These comments will be stored in the RASS file along with the analytical data and sample name and description. The stored comments (including the "Sample name and description") can be no longer than 64 characters, including spaces between words, punctuation, etc.

The purpose of the comments is to provide the submitter an opportunity to supply additional information about the samples that may be useful when the data are retrieved.

Numbered boxes

Information about individual samples is coded in the numbered boxes of the submittal form. Instructions and tables for coding follow in this section of the manual. Which boxes and how many boxes are to be used vary with the category of sample material (See page 19). These box numbers correspond to column numbers on standard 80 column punch cards.

Special purpose coding

Boxes 70 to 75 are reserved for your own special purpose coding scheme if such a scheme might be useful to you. The boxes may contain any individual characters A through Z or 0 through 9, as well as certain special characters compatible with

the computer system. The codes in the reserved boxes may be used as a basis for data retrieval with complete generality.

Replicated sample information

If certain items of information apply to a number of consecutive samples, ditto marks may be used to indicate this, and if the same description fits all the samples on a page, only the top sample on the page need be described, with the notation under Comments "all samples same." The rest of the samples on the page are then designated only by their sample field numbers.

Coding Instructions

Use "Coding Sheet and Request for Analysis" form (page 7)

1. Code boxes 11 to 17 as described on pages 16 to 18.
2. Code box 19 as indicated on page 19, and then code further descriptions of rock or other substances as indicated.
3. In cases where more than one code is applicable, use the one that is more specific (e.g. "Devonian" rather than "Paleozoic," "arkose" rather than "sandstone," "anthracite" rather than "coal.")
4. If unknown or very uncertain, leave blank. Do not code.
5. Boxes 70 to 75 are reserved for "private" special purpose codes that may be devised by individual projects to facilitate retrieval of selected data sets for computer processing. The Data Processing Group will assist you in devising special-purpose coding schemes if assistance is needed.

General

Box 11 - This is IMPORTANT - Place a "T" in box 11 to indicate that you are using this third edition of the sample submittal manual. - This is IMPORTANT.

Box 12 - Character of the sample.

Typical of a larger body or population at the sample site

Atypical of the larger body or population from which the sample was taken. (Sample was selected for some special attribute and is not intended to be typical.)

Typicalness unknown or uncertain

A	B	C	Single sample (e.g., hand specimen, grab sample)
D	E	F	Composite sample (e.g., chip samples)
G	H	I	Channel sample
J	K	L	Single, composite, channel or any other type sample processed in the field or laboratory (e.g., panned concentrate, mineral separate, purified, leached, ashed, evaporated, etc.). Use the codes on the following pages to describe the nature of the original unprocessed sample. Indicate the nature of the processed sample under "Sample name and description" and/or "Comments." 1/
X	Y	Z	Other

1/ Most plants, organic-rich soils and rock, and other organic materials are ashed in the laboratory prior to analysis and therefore should be coded here (Box 12) as J, K, or L.

Box 13 - Source of sample

(If unknown or inapplicable, do not code)

A. Natural outcrop (or surface layer)

B. Roadcut

C. Float

D. Open pit mine or quarry

E. Prospect pit

F. Underground mine

G. Mine dump

H. Mill product (smelters, tailings)

I. Refinery product

J. Drill core or auger sample

K. Drill cuttings, sludge

L. Produced from well (oil, water, etc.)

M. Marine sample

Z. Other

Boxes 14 - 16 - Geologic age of sample

(If unknown, very uncertain, or inapplicable, do not code)

Age known - code in box 14 K

Age uncertain - code oldest possible age in box 15 (J) and youngest possible age in box 16. K

A. Precambrian undifferentiated

B. Early Precambrian (Archeozoic)

C. Late Precambrian (Proterozoic)

D. Paleozoic

E. Cambrian

F. Ordovician

G. Silurian

H. Devonian

I. Mississippian

J. Pennsylvanian

K. Permian

L. Mesozoic

M. Triassic

N. Jurassic

P. Cretaceous

Q. Tertiary

R. Paleocene

S. Eocene

T. Oligocene

U. Miocene

V. Pliocene

W. Quaternary

X. Pleistocene

Y. Holocene

Box 17 - Economic geology

Use of this section is contemplated for identifying samples of ores and/or related protore or altered materials, or other samples of possible economic significance. Use the codes below if applicable, and describe the sample briefly under "Sample name and description" and/or "Comments."

Code in box 17
↓

A. Sample is of mineralized rock - contains epigenetic ore minerals. Code box 19 and other boxes as per instructions on page 19.

B. Sample is of altered rock - may contain epigenetic gangue minerals. Code box 19 and other boxes as per instructions on page 19.

C. Sample is of vein, cavity, or fracture filling, or is of material that has completely replaced a pre-existing rock, and contains ore minerals. Samples in this category, unless they are of single minerals or of one of the substances itemized on page 31, are generally coded as Z in box 19 (page 19), and no further coding is required.

D. Sample is of vein, cavity, or fracture filling, or is of material that has completely replaced a pre-existing rock, but contains gangue minerals only. Samples in this category, unless they are of single minerals or of one of the substances itemized on page 31, are generally coded as Z in box 19 (page 19), and no further coding is required.

E. Sample is from a residual concentration that is or may be of economic value (e.g. lateritic iron deposits, certain bauxite deposits, etc.). Samples in this category, unless they are of single minerals or of one of the substances itemized on page 31, are generally coded as Z in box 19 (page 19), and no further coding is required.

F. Sample has not been mineralized or altered, but contains or may contain economic concentrations of metals (e.g. magmatic segregation, sedimentary iron ore, placer, etc.). Code box 19 and other boxes as per instructions on page 19.

G. Sample has not been mineralized but is from material that is or may be of economic value as a non-metallic ore or product (e.g. phosphorite, oil shale, coal, building stone). Code box 19 and other boxes as per instructions on page 19.

Z. Other materials from or related to deposits of existing or potential economic significance. Code box 19 and other boxes as per instructions on page 19.

Category of sample material

Code in Box 19	For additional coding required, see page
A. Igneous rock	20
B. Metamorphic rock (including migmatite)	21
C. Sedimentary rock	22
D. Unconsolidated sediment	23
E. Single mineral	24
F. Soil	25
G. Water	26
H. Plant	27, 28, 29
I. Organic fuel or related substance	30
J. Miscellaneous (See list on page 31.)	31
Z. Other 1/	—

1/ No further coding required. Describe sample briefly under "Sample name and description" and/or "Comments."

Note: DON'T FORGET TO PLACE A "T" IN BOX 11 (See top of page 16.).

Igneous rocks

(Use if and only if box 19 contains an A)
(Where more than one code is applicable, use the one that is more specific.) (If unknown or very uncertain, do not code.)

Box 20 - Form

Code

A. Lava flow
B. Volcanic breccia or agglomerate
C. Pyroclastic, unsorted, indurated
D. Pyroclastic, unsorted, loose
E. Pyroclastic, bedded, indurated
F. Pyroclastic, bedded, loose
G. Pyroclastic
H. Extrusive rock
J. Dike
K. Sill, laccolith, etc.
L. Stock
M. Pluton
N. Pipe or plug
P. Intrusive breccia
R. Intrusive rock
S. Flow or sill(?)
T. Inclusion (of uncertain origin)
U. Xenolith
V. Autolith
W. Segregation

Box 21 - Texture and structure

Porphyritic (code matrix texture)
Non-massive (layered, laminated)
Massive

A, B, C. Glassy
D, E, F. Aphanitic
G, H, J. Fine grained, < 1 mm
K, L, M. Medium grained, > 1 mm, < 5 mm
N, P, Q. Coarse grained, > 5 mm, < 2 cm
R, S, T. Pegmatitic, > 2 cm
U, V, W. Pumiceous
X, Y, Z. Other

Box 22 - Quartz-feldspar relations

Quartz-bearing
Quartz-free (< 5% quartz)

A, B. K-Na feldspars dominant
C, D. K feldspar=plagioclase
E, F. Plagioclase dominant
G, H. Feldspar present
J, K. Little or no feldspar
L, M. Feldspathoidal

Box 23 - Tentative name

A. Felsic igneous rock
B. Intermediate igneous rock
C. Mafic igneous rock
D. Ultramafic igneous rock
E. Alkalic igneous rock
F. Carbonatite
G. Alaskite
H. Granite
J. Pegmatite
K. Aplite
L. Syenite
M. Quartz monzonite
N. Monzonite
P. Granodiorite
Q. Quartz diorite
R. Diorite
S. Gabbro
T. Diabase
U. Dunite
V. Anorthosite
W. Pyroxenite
X. Amphibolite
Y. Peridotite
1. Rhyolite
2. Trachyte
3. Phonolite
4. Quartz latite
5. Latite
6. Dacite
7. Andesite
8. Basalt
9. Olivine basalt
+. Lamprophyre
-. Volcanic glass
*. Obsidian
@. Pumice

Z. Other (Give name under "Sample name and description.")

(List prominent accessory minerals under "Sample name and description" and/or "Comments.")

Metamorphic rocks

(Use if and only if box 19 contains a B)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Type of metamorphism

Metaigneous
| Metasedimentary
| | Original rock type uncertain
↓ ↓ ↓

A, B. C. Contact metamorphism
D, E, F. Regional metamorphism
G, H, J. Shear metamorphism
K, L, M. Hydrothermal (metamorphic or deuteric)
N, P, Q. Mixed types of metamorphism

Box 21 - Facies or grade

(See Turner, F. J., 1968, Metamorphic Petrology: McGraw-Hill Book Company, pages 187 and 366)

Code

After Turner (1968)

A. Albite-epidote-hornfels facies
B. Hornblende-hornfels facies
C. Pyroxene-hornfels facies
D. Sanidinite facies
E. Zeolite facies
F. Prehnite-pumpellyite-metagraywacke facies
G. Greenschist facies
H. Amphibolite facies
J. Granulite facies
K. Glaucophane-lawsonite-schist facies
L. Eclogite facies

General

M. Low grade
N. Medium grade
P. High grade

Z. Other (Specify under "Comments")

Box 22 - Metasomatism

Code

1. Metamorphism was clearly metasomatic
2. Metamorphism may have been metasomatic
3. No evidence for metasomatism

Box 23 - Texture

Schistose (fissile)
| Gneissic (layered)
| | Massive
↓ ↓ ↓

A, B, C. Fine grained, <1 mm
D, E, F. Medium grained, 1 mm - 5 mm
G, H, J. Coarse grained, >5 mm
K, L, M. Inequigranular
N, P, Q. Porphyroblastic

Box 24 - Composition

Quartz present
| Quartz not present
| | Presence of quartz uncertain
↓ ↓ ↓

A, B. C. Calcareous or dolomitic (marble)
D. Siliceous (quartzite)
E, F, G. Ferruginous or manganiferous
H, J, K. Alumno-silicate, pelitic (schist, phyllite, mica gneiss)
L, M, N. Calc-silicate (skarn)
P, Q, R. Feldspathic (granite gneiss, syenite gneiss, biotite gneiss)
S, T, U. Mafic (greenstone, greenschist, amphibolite)
+, V, W. Ultramafic (serpentine, pyroxenite)
X, Y, Z. Other (Specify under "Comments")

(The examples in parentheses above do not include all the possible rocks in each category)

Note: List significant minerals, especially metamorphic index minerals, under "Sample Name and Description" and/or "Comments".

Sedimentary rocks

(Use if and only if box 19 contains a C)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Tentative name

Code
A. Claystone
B. Mudstone
C. Shale
D. Siltstone
E. Sandstone
F. Quartzite
G. Conglomerate
H. Arkose
I. Graywacke
J. Limestone, marlstone
K. Dolomite, dolomitic marlstone
L. Limestone and/or dolomite

Code
M. Bentonite
N. Phosphorite
P. Chert
Q. Breccia
R. Water-laid tuff
S. Oil shale
T. Evaporite
U. Sulphate deposit (gypsum, anhydrite)
V. Chloride deposit (halite, sylvite)
W. Carbonate deposit (nahcolite, etc.)

Z. Other (Describe sample briefly under "Sample name and description" and/or "Comments")

Boxes 21-22 - Modifier (Code up to 2 in order of predominance)

Code
A. Laminated
B. Massive
C. Clastic
D. Bioclastic
E. Concretionary
F. Nodular
G. Oolitic
H. Pelletal
J. Sandy
K. Silty
L. Clayey
M. Calcareous

Code
N. Dolomitic
P. Bentonitic
Q. Ferruginous
R. Manganiferous
S. Carbonaceous (organic)
T. Glauconitic
U. Arkosic
V. Lithic
W. Micaceous
X. Phosphatic
Y. Siliceous

Code
1. Cherty
2. Tuffaceous
3. Volcanic
4. Zeolitic
5. Petroliferous
6. Sulphatic (gypsum, anhydrite, etc.)
7. Chloridic (halite, sylvite, etc.)
8. Carbonatic (nahcolite, etc.)

Z. Other (Specify under "Sample name and description" and/or "Comments")

Box 23 - Environment of deposition

Code
A. Marine
B. Continental
C. Transitional

Unconsolidated sediments

(Use if and only if box 19 contains a D)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Nature of material

Code
1. Gravel
2. Sand
3. Silt
4. Clay
5. Mud (silt and/or clay)
6. Ooze
7. Marl
8. Precipitate
9. Peat (may also be coded as an organic fuel, page 30)

Boxes 21-22 - Modifier (Code up to 2 in order of predominance)

Code	Code	Code
A. Laminated	N. Dolomitic	1. Cherty
B. Massive	P. Bentonitic	2. Tuffaceous
C. Clastic	Q. Ferruginous	3. Volcanic
D. Bioclastic	R. Manganiferous	4. Zeolitic
E. Concretionary	S. Carbonaceous (organic)	5. Petroliferous
F. Nodular	T. Glauconitic	6. Sulphatic (gypsum, anhydrite, etc.)
G. Oolitic	U. Arkosic	7. Chloridic (halite, sylvite, etc.)
H. Pelletal	V. Lithic	8. Carbonatic (nahcolite, etc.)
J. Sandy	W. Micaceous	Z. Other (Specify under "Sample name and description" and/or "Comments")
K. Silty	X. Phosphatic	
L. Clayey	Y. Siliceous	
M. Calcareous		

Box 23 - Environment of deposition

Code	Code
A. Stream deposit	M. Offshore bar or spit
B. Lake deposit	N. Deltaic deposit
C. Talus or colluvium	P. Lagoonal deposit
D. Alluvial fan deposit	Q. Estuarine deposit
E. Dunes sand or loess	R. Other type of marginal marine deposit
F. Swamp deposit	S. Marine terrace deposit
G. Spring deposit	T. Nearshore marine deposit
H. Residual or lag deposit	U. Deep sea deposit
I. Glacial deposit	V. Other type of marine deposit
J. Other type of continental deposit	
K. Beach deposit	
L. Tidal flat deposit	Z. Other

Minerals

(Use if and only if box 19 contains an E)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Mineral group

Code

A. Native elements
B. Sulfides
C. Sulfosalts
D. Oxides (excluding SiO_2)
E. Multiple oxides containing Nb, Ta, Ti
F. Halides
G. Carbonates
H. Nitrates and borates
J. Sulfates and chromates
K. Phosphates
L. Vanadates and uranates
M. Arsenates and antimonates
N. Selenium and tellurium compounds
P. Molybdenates and tungstates
Q. Salts of organic acids
R. Forms of SiO_2
S. Feldspars, feldspathoids and zeolites
T. Amphiboles, pyroxenes and other chain structures (including polygorskite and sepiolite)
U. Micas, clays, and other sheet structures
V. Ring structures and isolated tetrahedra
W. Other silicates
Z. Other

Box 21 - Host material

Code

A. Mafic intrusive
B. Mafic extrusive
C. Intermediate intrusive
D. Intermediate extrusive
E. Felsic intrusive
F. Felsic extrusive
G. Pyroclastic
H. Pegmatite, vein
J. Serpentine, metamorphosed mafic rocks
K. Hornfels
L. Tactite
M. Quartzite
N. Slate
P. Phyllite
Q. Schist
R. Gneiss
S. Granulite
T. Marble
U. Shear product
V. Conglomerate, sandstone
W. Shale, siltstone
X. Limestone
Y. Dolomite
1. Evaporite
2. Alluvium
3. Colluvium
4. Glacial drift
5. Wind-blown deposit
6. Organic material
7. Beach deposit
Z. Other (Specify under "Comments".)

Boxes 26-30 - Alphabetic code for mineral name

Use a five-letter code (one letter in each box), 1st letter and following 4 consonants. Delete: a, e, i, o, u, and y unless entire name is $\leq$ five letters; if less than 4 consonants in name, leave blank boxes on the right.

Soils

(Use if and only if box 19 contains an F)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

(Note: Assistance in identifying and coding soil samples can be obtained from the Data Processing Group.)

Box 20 - Soil horizon

Code

A. Top soil (A horizon)
B. Intermediate zone (B horizon)
C. Bottom zone (C horizon)
E. Composite (mixture of zones)
F. No zoning apparent

Note: Record depth from which sample was taken under "Comments."

Box 21 - Soil category (after Ball, D. F., 1967, Classification of soils, p. 121-125 in G. F. Peterken, ed., Guide to the check sheet of IBP areas: Oxford and Edinburgh, Blackwell Scientific Publications, 133 p.)

Code

A. Saline soil.
B. High sesquioxide (ferritic) soil. (Red to reddish brown in some or all horizons)
C. Organic soil. (Highly organic throughout profile; peat, bog)
D. Well-drained non-saline, non-ferritic, calcareous soil with well-marked soil horizons. (Strong profile development)
E. Well-drained non-saline, non-ferritic, non-calcareous soil with well-marked soil horizons.
F. Poorly drained non-saline, non-ferritic, calcareous soil with well-marked soil horizons.
G. Poorly drained non-saline, non-ferritic, non-calcareous soil with well-marked soil horizons.
H. Soil with poorly defined soil horizons (weak profile development) caused by climate. (Example--some desert soils, some arctic soils)
I. Soil with poorly defined soil horizons caused by youth of soil. (Example--recent alluvium, colluvium, regosol)
J. Humus (forest litter, etc.)

Box 22 - Present biotic setting

Code

1. Cultivated land (including orchards, pastures)
2. Native grassland
3. Scattered timber land
4. Forest
5. Swamp (including bog)
6. Desert
7. Tundra (including alpine tundra)
8. Shrub or brush covered (chaparral, sagebrush)
Z. Other

Water

(Use if and only if box 19 contains a G)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Type of water

Surface water

A. Stream

B. Normal lake

C. Evaporite lake

D. Marginal marine (brackish)

E. Normal marine

F. Canals and similar works of man

G. Glacial

H. Other surface water 1/

Ground water

J. Spring

K. Well

L. Mine

M. Oil well brine

N. Other ground water 1/

Other water

S. Atmospheric

T. Liquid inclusions

U. Pore water

Z. Other 1/

Box 21 - Environment at collection site

Water temperature < 75°F

Water temperature > 75°F

A, B. Igneous rocks

C, D. Metamorphic rocks

E, F. Sedimentary rocks

G, H. Alluvium or other unconsolidated sediments

1/ Describe sample briefly under "Sample name and description" and/or "Comments."

Plants 1/

(Use if and only if box 19 contains an H)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

(Note: Assistance in identifying and coding plant samples can be obtained from the Data Processing Group.)

Box 20 - Group	Box 21 - Class or Order	Common Name or Notes
1. Dicotyledoneae	(do not code Box 21)	Seed plants; broad-leafed, net-veined; trees, shrubs, forbs.
2. Monocotyledoneae	(do not code Box 21)	Seed plants; narrow-leafed, parallel-veined; grasses, sedges, lilies, etc.
3. Gymnospermae	----------	Mostly coniferous, evergreen trees and shrubs.
	1. Pinales	Pine, spruce, hemlock, fir, larch, cypress, juniper, etc.
	2. Taxales	Yew.
	3. Ginkgoales	Ginkgo (maidenhair) tree.
	4. Gnetales	Mormon tea, and a few others.
	5. Cycadales	Cycads, "sago palm."
4. Pteridophyta	----------	The ferns and fern relatives.
	1. Equisetinae	Horsetails, "scouring rush."
	2. Lycopodinae	Lycopodium, "ground pine."
	3. Filicineae	True ferns (including Azolla, Marsilia)
	4. Others	(Selaginella, Psilotum, Isoetes, etc.)
5. Bryophyta	1. Musci	Mosses.
	2. Hepaticae	Liverworts, leafy and thallose.
	3. Anthocerotae	Hornworts.
	4. Sphagna	Sphagnum.
6. Algae	1. Rhodophyta	Red algae; mostly marine.
	2. Phaeophyta	Brown algae; all marine.
	3. Pyrrophyta	Flame algae.
	4. Chrysophyta	Golden algae.
	5. Chlorophyta	Green algae, "pond scum."
	6. Charophyta	Stoneworts.
	7. Euglenophyta	Euglena and other amoeba-like.
	8. Cyanophyta	Blue-green algae.
7. Fungi	1. Phycomycetes	Water molds, white rust, bread mold, et
	2. Ascomycetes	Yeast, ergot, powdery mildew, truffles, morels, etc.
	3. Basidiomycetes	Mushrooms, puffballs, smuts, rusts, etc
	4. Fungi Imperfecti	The imperfect fungi.
	5. Ascolichenes	Lichens, with Ascomycetes.
	6. Basidiolichenes	Lichens, with Basidiomycetes.
	7. Lichenes Imperfecti	The imperfect lichens.
8. Myxophyta	1. Myxomycetacea	Slime molds.
	2. Acrasieae	
	3. Plasmodiophoreae	
	4. Bacteriophyta	Bacteria.

1/ Also see pages 28 and 29.

Boxes 22 - 25 - Family

The families are to be coded by a 4-digit number, as presented on pages 9-33, "Family Names of the Plant Kingdom," International Plant Index, vol. 1, 1962 by Sydney W. Gould. Use only the numbers to the right of the letter "V"; all entries must be 4 digits in length. If the number is less than 4 digits, it should be preceded by zeros (e.g. 42 should be 0042).

Box 26 - 27 - Species

Coding: 1st two letters

Boxes 28 - 30 - Genus

Coding: 1st three letters

Note: Reversal of the order of "Species" and "Genus" here is deliberate, and is done to accommodate certain features of the data processing system.

Box 35 - Plant part

-. Whole plant.
0. Above ground parts (usually stems and leaves combined as 1 sample, but seeds and fruits may also be combined).
1. Roots.
2. Stems (including twigs, branches, trunk, or wood).
3. Leaves (including leaf stalks or petioles).
4. Stem tips (young branch tips with immature leaves).
5. Bark of roots.
6. Bark of stems (branches or trunk).
7. Seed.
8. Fruit (Note: grass seed and cereal grains are fruits.).
9. Flowers (including entire inflorescence).
Z. Other

Box 36 - Habitat

0. Xerophyte (plants specially adapted to and growing in dry locations).
1. Mesophyte (plants growing in soil of moderate moisture content).
2. Hydrophyte (plants growing in bogs, swamps; aquatic plants).
3. Phreatophyte (plants whose roots extend to ground water table and are thus able to grow in very dry surface soil).
4. Halophyte (plants specially adapted to and growing in high salt concentrations in the soil, including "alkali" soil).
5. Epiphyte (plants growing on other plants, but deriving moisture from the air).
6. Parasite (plants growing on other plants and deriving nourishment from them).
7. Saprophyte (plants growing on decaying organic matter).

Box 37 - Life form

0. Tree, conifer (usually evergreen, with needle-like leaves).
1. Tree, non-conifer (usually deciduous, with broad leaves).
2. Shrub, conifer.
3. Shrub, non-conifer.
4. Forb (herbaceous, usually broad-leaved, plants).
5. Grass and grass-like (including sedges and rushes).
6. Vine, woody.
7. Vine, herbaceous.

Z. Other

Box 38 - Biotic setting

1. Cultivated land (including orchards, pastures)
2. Native grassland (grazing land)
3. Scattered timber land
4. Forest
5. Swamp (including bog)
6. Desert
7. Tundra (including alpine tundra)
8. Shrub or brush covered (chaparral, sagebrush)

Z. Other

Organic fuels and related substances
(Use if and only if box 19 contains an I)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20 - Tentative name of fuel or related substance
Code

A. Peat (May also be classified as an unconsolidated sediment, page 23).

B. Coal

C. Lignite

D. Subbituminous coal

E. Bituminous coal

F. Anthracite coal

J. Natural gas

K. Petroleum

L. Solid and semi-solid hydrocarbon (asphalt, gilsonite, etc.)

Z. Other (Describe briefly under "Sample name and description" and/or "Comments.")

Note: Samples of oil shale should be coded as sedimentary rocks.

N/A

Miscellaneous

(Use if and only if box 19 contains a J)
(Where more than one code is applicable, use the one that is more specific)
(If unknown or very uncertain, do not code)

Box 20
Code

A. Gossan

B. Limonite

C. Jasperoid

D. Nodule or concretion

E. Plant fossil

F. Invertebrate fossil

G. Vertebrate fossil

H. Modern shell

J. Animal parts

K. Artifact

L. Synthetic solution

M. Synthetic product (other than a solution)

N. Desert varnish

P. Caliche

Q. Duracrust

R. Fumarolic sublimate

S. Fault breccia, mylonite, or gouge

T. Meteorite

U. Tektite

Describe sample briefly under "Sample name and description" and/or "Comments."

INSTRUCTIONS FOR SUBMITTING SAMPLES TO THE FIELD SERVICES SECTION LABORATORIES OF THE BRANCH OF EXPLORATION RESEARCH

General

Only data from certain projects submitting samples to the Field Services Section Laboratories are entered into the RASS system. Other projects will use the same Request for Analysis forms in submitting samples, but they need only be partially completed. A copy of the front page of the Request for Analysis form is shown on page 33, and a list of descriptive codes is given on page 34. The flow of the samples, Request for Analysis forms, and the analytical data through the mill is diagrammed in figure 3.

To make arrangements for having the data from your project entered into RASS, contact the Data Processing Group.

Page 1 of 1 Pages.

REQUEST FOR ANALYSIS

Job No. _____
No. of Samples 5

Submitter: J. L. JONES
Address: DENVER
Phone No.: EXT. 3456
Project No.: 976020
Security Status: B (code)

Date submitted: 8-14-68
Collected from State: NEVADA
County: ELKO
Offshore / _____ / check
Applicable until: JAN., 1970 (date)

Send to:
Sample Control
Rm. 1421, Bldg. 25
Federal Center
Denver, Colo. 80225

WORK REQUESTED

AA or chemical: (circle)	Assay (specify)	Spectrographic: (circle)	Check here if arrangements have been made to store data in RASS
Au, Hg, (Cu), Pb, Zn, CxHM, CxCU, Ag, As, Sb, Mo, Te, U, Ni, Co, W, Other: (specify)		(Semiquant. standard 30 elements) Quantitative (specify) Other (specify)	✓

**** Put remarks or special instructions on reverse side. ****

DESCRIPTION OF SAMPLES

Check or code as indicated

(Please group samples of similar type together on forms below)

Results needed by: Nov., 1968 (date)

Field No.	Tag No.	Location (degrees, minutes, seconds) or X - Y grid: Lat. (X)	Long. (Y)	Check One: ROCK	SOIL	STR. SEDIMENT	ORGANIC MATERIAL	OTHER	Codes for RASS: MATERIAL CLASS	SAMPLE TYPE	SAMPLE SOURCE	ROCK TYPE	IGNEOUS FORM	STRUC. SETTING	MATRIX	OXIDATION STATE	ALTERATION	ORE MINERALS	MINERAL DEP. FORM	CONCENTRATE 1/	Comments
JLJ-37	ABC 123	115°30'25"	41°06'42"		X				S	S	A										
JLJ-38	ABC 124	115°45'00"	40°39'20"			X			B	U											
JLJ-39	ABC 125	114°50'08"	40°30'10"	X					A	S		X									DOLOMITE
JLJ-5X	ABC 205	115°08'30"	41°00'03"	X					A	S			C		A		D				
JLJ-107	ABF 061	114°55'03"	40°10'38"					X	O	S	✓				C						CONTAINS SOME SULFIDES

1/ Place a "C" in this column if the sample to be analyzed is an artificial concentrate (e.g. panned concentrate, heavy mineral separate, etc.).

CODES FOR DESCRIPTIONS OF SAMPLES
(If uncertain, or inapplicable, leave blank)

Security status

A. Data may be released only to agencies of U.S. Gov't.
B. Data may be released only within U.S.G.S.
C. Data may be released only to submitter.
D. Data may be released to anyone.

Material class

A. Rock

B. Unconsolidated sediment

C. Organic material

5. Soil

0. Other (zero)

Sample type

S. Single (grab)

U. Composite

V. Channel

Z. Other

Sample source

A. Outcrop or surface layer

B. Mine

F. Dump or pros. pit

Ø. Float

P. Drill hole

N. Other

Rock type (Be as specific as possible)

A. Unidentified rock

B. Sedimentary rock

C. Metamorphic rock

D. Igneous rock

E. Unconsolidated sediment

F. Conglomerate

G. Sandstone

H. Siltstone

I. Claystone

J. Shale

K. Carbonate

L. Gneiss

M. Schist

N. Metaquartzite

Ø. Marble

P. Skarn

Q. Phyllite

R. Slate

S. Felsic igneous

T. Intermediate igneous

U. Mafic igneous

V. Ultramafic igneous

W. Feldspathoidal

Y. Chert or jasperoid

X. Other

Igneous form

A. Plutonic

B. Extrusive

C. Dike/sill

Structural setting

A. Fracture/joint

B. Shear or fault

C. Other

Matrix (predominantly)

A. Silica

B. Fe/Mn

C. Carbonate

D. Clay

E. Other

Oxidation state

A. Oxidized

B. Partially oxidized

C. Unoxidized

Alteration

A. Propylitic

B. Argillitic

C. Siliceous

D. Sericitic

E. Feldspathic

F. Other

Ore minerals

A. Base metals

B. Precious metals

C. Mixed base and precious metals

Mineral deposit form

A. Vein

B. Replacement

C. Disseminated

D. Other

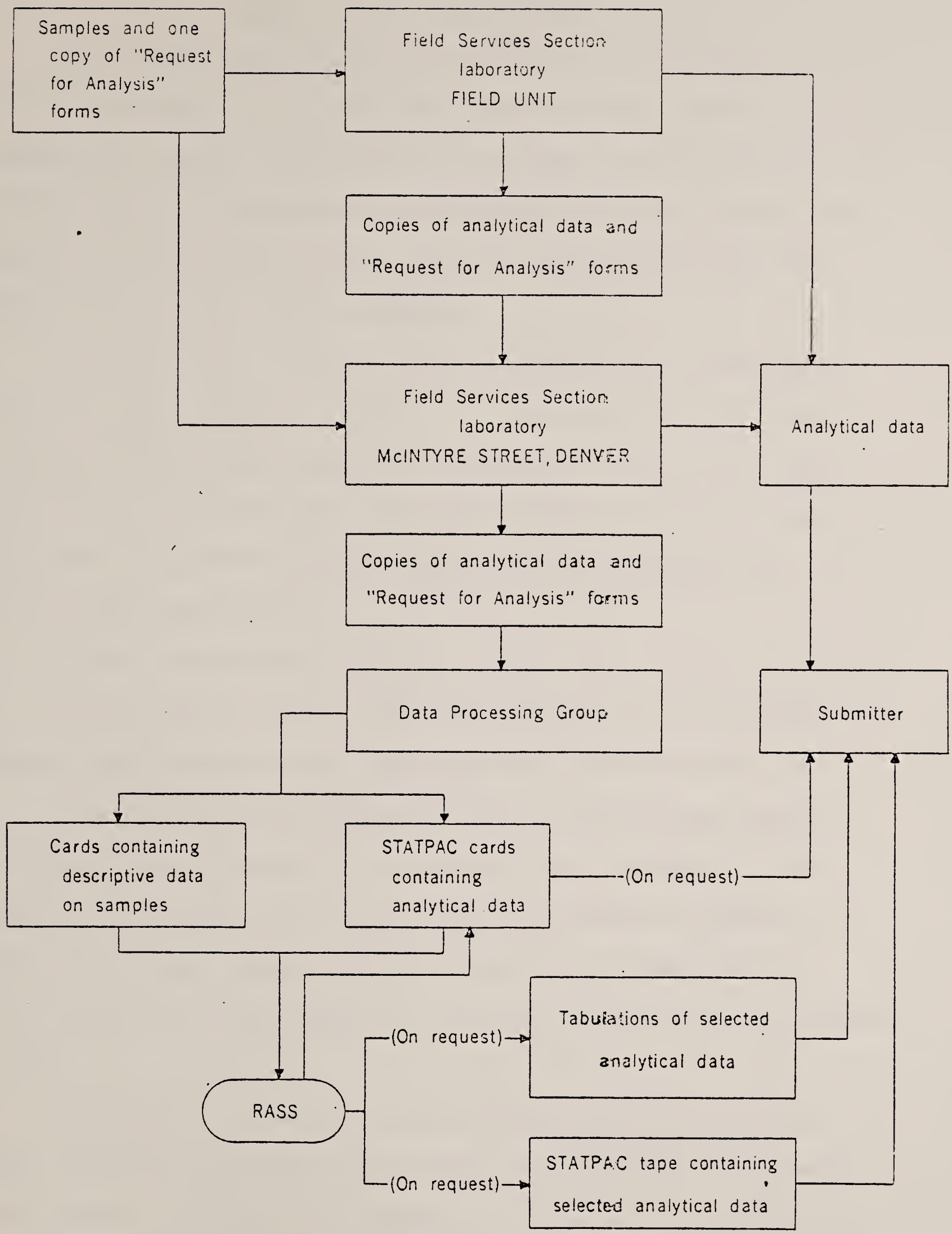

Figure 3.--Diagram showing organization of procedure for processing data from laboratories of the Field Services Section of the Branch of Exploration Research.

General Instructions for All Projects

All projects must complete the top portions of the Request for Analysis form (page 33) on submitting samples to Field Services Section Laboratories, whether in the field or in Denver. Most of this portion of the form is self-explanatory. If the sample is from offshore, give the name of the adjacent state. Leave the space for Job. No. blank. Only one copy of the forms is required.

In regard to the "Security Status" code for the top portion of the form, your attention is called to the memorandum from the Chief Geologist reproduced on page 10 of this manual. If A, B, or C codes are used, please indicate the date such code may expire in the space provided. If no Security Status code is required, you may insert a D or leave the space blank.

In the space provided for project number, please record all 6 digits. You are urged to consult with representatives of the Field Services Section before completing the "Work Requested" portion of the form.

All projects must also complete certain items for each sample on the "Description of Samples" portion of the form, including a) field number, b) tag number, c) a check to indicate whether the sample is of rock, soil, stream sediment, organic material, or "other," and d) a brief description of the sample if it is rock or "other" in the "Comments" column.

Processing of the samples in the laboratories will be greatly facilitated and problems of contamination will be reduced if you will group samples of similar kind together on the forms. Information given in the "Comments" column of the form will also help in this regard, and will be of aid to the analyst in selecting the best laboratory technique.

Special Instructions for Projects Having Data Entered Into RASS

Additional requirements for completion of the Request for Analysis forms for projects having their data entered into RASS are: a) a check in the appropriate place in the right-hand part of the Work Requested section of the form, b) coded descriptions of the samples and the geologic environments from which they were taken, and c) if automatic plotting of maps is contemplated, either the latitude and longitude at which each sample was taken, or an X-Y location based on a grid coordinate system of your own choosing.

Coded descriptions of the samples

Aside from checking the form to indicate whether the sample is of rock, soil, stream sediment, organic material, or "other," a coded description of the sample and, if applicable, the environment from which the sample was taken must be given in the columns indicated on the form. The codes are defined on page 34 of this manual, and are self-explanatory.

Latitude and longitude or X-Y location

This information should be recorded on the Request for Analysis form if automatic plotting of geochemical maps is contemplated, or if data are to be retrieved by location other than state or county. The location at which each sample was collected may be given as latitude and longitude, or in terms of an X-Y coordinate scheme defined specifically for the project area, but one or the other method, not both, should be used for a given project. The accuracy of the final geochemical maps will, of course, depend on the degree of detail and care with which the location information is recorded. The degree of detail should be consistent with the scale at which the data are to be plotted.

Latitude and longitude may be given in whole degrees, minutes, and seconds, not fractions thereof. One second of latitude equals about 100 feet. One second of longitude equals about 85 feet in Arizona and 70 feet in Idaho.

Values of X and Y may be either positive or negative and may contain up to 5 figures, with or without a decimal point (e.g. 100.86, 10086, -10086, 9999.9, 9.9999, -99.999, or 99999 are all acceptable). This will allow a location accuracy of 1 foot in an area 38 miles across, or of 10 feet in an area 380 miles across, if the coordinate scheme is properly defined.

Comments

The "Comments" field on the Request for Analysis form is for additional information pertaining to the sample that is not provided for in the coding scheme. The comments will be stored in the RASS file along with the coded information and the analytical data. The comments can be retrieved with the data, but cannot be used as a basis for searches. Comments are limited to 64 characters in length, including spaces between words and all punctuation. Please be legible.

Field No. and Tag No.

The records in the RASS file are sequenced according to "Tag No." and tag numbers, therefore, provide a more convenient basis for retrieval than do field numbers. Because tag numbers are consistently 6-digit numbers, they are also better suited for handling in computer processing. However, if you anticipate that retrieval of your data by field number will be necessary, please make prior arrangements with the Data Processing Group before your samples are submitted to the laboratory.

Codes for other information

The coding scheme presented here for samples submitted to the Field Services Section is only a subset of that which can be used in the RASS system. If you wish to enter and retrieve data on the basis of coded geologic age, formation name, or other factors, please contact the Data Processing Group before submitting your samples to the laboratory.

INSTRUCTIONS FOR RETRIEVAL OF DATA FROM RASS

The information supplied when submitting samples for analysis, and the analytical data, are stored on magnetic tapes as part of the RASS system. Information and data pertaining to samples submitted to the Branch of Analytical Laboratories are on one group of tapes, and that on samples submitted to the Field Services Section Laboratories, are on another. In either case, selected data can be retrieved by contacting the Data Processing Group. A search statement will be formulated to define the samples on which data are to be retrieved. It will be necessary to know whether the retrieved data are only to be listed, or whether specific data are to be transferred to either a STATPAC tape or a STATPAC card deck for processing in one or more programs of the STATPAC system. The responsibility of the Data Processing Group ends when the data requested are tabulated or placed on a STATPAC tape or card deck and transmitted to the requester. The responsibility for analysis and interpretation of the data are his. The Data Processing Group, however, will be of whatever assistance it can in an advisory capacity, and in some cases will prepare statistical summaries of the data if requested to do so.

Search statements

The search statement contains the criteria defining the samples on which data are to be retrieved. It may consist simply of a list of laboratory or tag numbers, or it may contain any criteria supplied on the Request for Analysis forms when the samples were submitted to the laboratory. <u>If the information was not supplied on the Request for Analysis forms, of course, it cannot be the basis for data retrieval</u>. Other criteria which may be contained in the search statement consist of the analytical results. Typical search statements may be formulated as follows:

A) All data on samples where:

1. The project number is either 976070 or 976071.
2. The date of submittal was June 1, 1968 or later.
3. The sample is from Utah, Nevada, Arizona, or California.
4. The geologic age is Cambrian.
5. The rock name is either sandstone or quartzite.
6. The Al_2O_3 content is equal to or greater than 3%.
7. The data release code is not A, B, or C.

B) Data on the Fe_2O_3 contents of all samples where:

1. The sample locality is west of the 100th meridian, but in the U.S.
2. The sample is from a volcanic flow.
3. Either the SiO_2 content is less than 50% <u>or</u> the sample was identified as quartz-free.
4. The data release code is not C.

C) All data on all soil samples:

1. Collected in Arizona.
2. Submitted by J. L. Jones or J. Q. Doe.

Entry into the STATPAC system

Any of the analytical data on samples satisfying the criteria contained in the search statement, as well as the latitude and longitude or X-Y location data, may be transferred from the RASS file to a STATPAC tape or a STATPAC card deck. The particular tape, identified by a tape number, may be supplied by the requester or by the Data Processing Group. When the retrieval has been completed, the requester will be given the following information:

1) Tape number.

2) Data set identifier.

3) N, the number of samples represented on the tape.

4) M, the number of variables (elements) represented on the tape.

5) Identification of the variables on the tape.

With this information (or, alternatively, with a STATPAC card deck) the requester will be able to process the retrieved data in the STATPAC system. Assistance may be obtained from personnel of either the Computer Center Division or the Branch of Geochemical Census. A diagram showing some of the principal programs contained in the STATPAC system is given in figure 4. The function of each program is described in a program documentation available from the Computer Center Division. The program documentations should be requested by number.

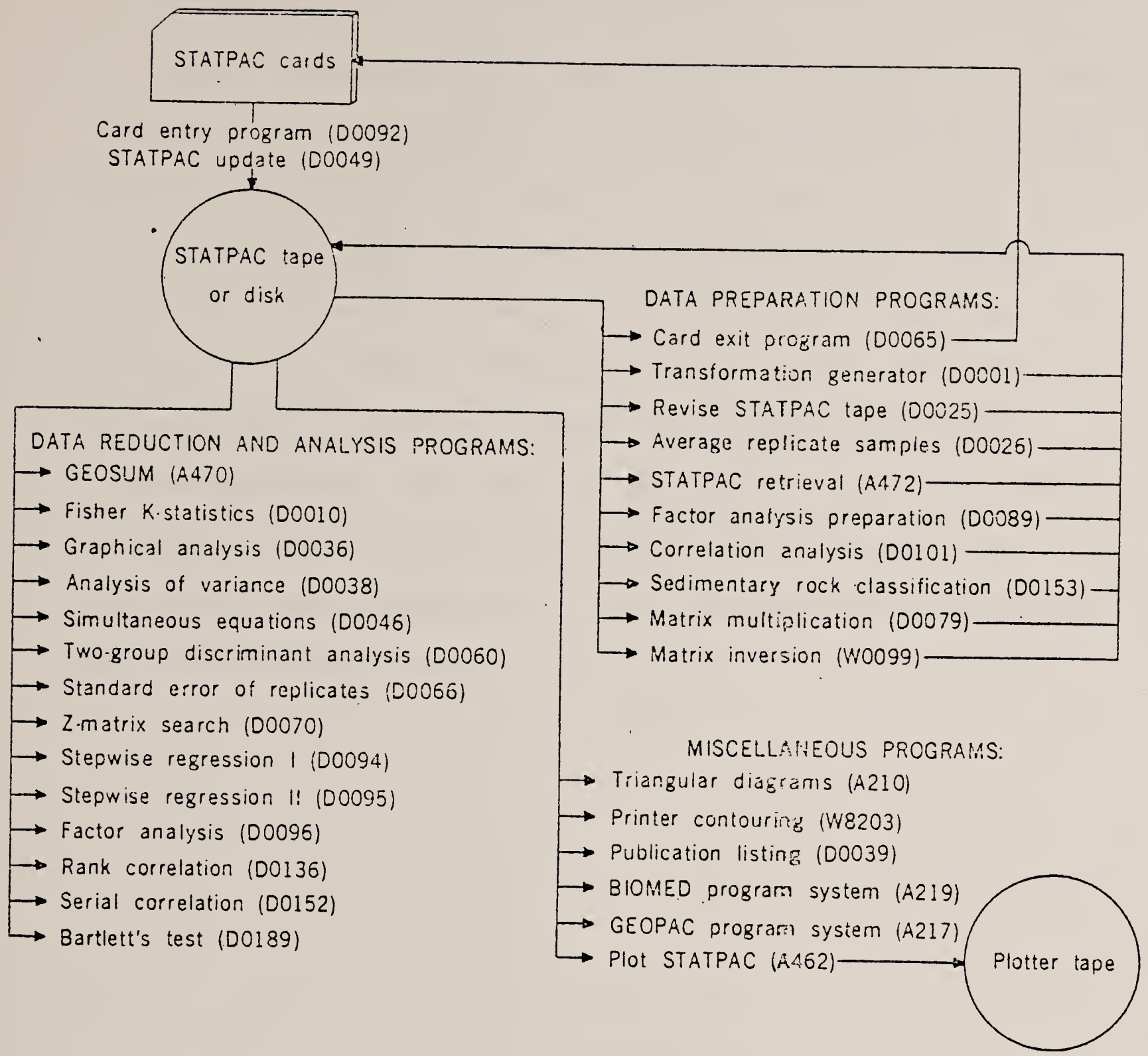

Figure 4.--Diagram of part of the STATPAC system.

INSTRUCTIONS FOR RETRIEVAL OF DATA FROM THE PRE-1968 CARD FILE

Data on samples submitted prior to 1968, stored in the Pre-1968 Card File, may be retrieved by contacting the Data Processing Group. Search statements will be formulated in the same way as described in the preceding section for retrieving data from RASS. Retrieved data will be supplied routinely in the form of a listing only. If the work is of particular importance or significance, the data may in some cases be placed on a STATPAC tape through some special programming effort. An attempt is being made to supply this service routinely, however, and you are urged to consult with the Data Processing Group if you wish to process data from the Pre-1968 Card File in the STATPAC system.

Acquired Lands. Lands in Federal ownership which are not public lands, having been obtained by purchase, condemnation, gift or by exchange.

Adjudication. Legal processing of applications, entries, claims, etc., to assure full compliance with the public-land laws and the regulations.

Applicant. An individual, corporation, state or local government, etc., applying for rights in, or title to, public lands or resources.

Application. A formal request for rights in, or eventual title to, public land or resources.

Appropriated public lands. Original public domain lands which are covered by an entry, patent, certification, or other evidence of land disposal; reserved public lands upon which improvements have been authorized for construction with the aid of Federal funds, or public lands covered by certain classes of leases.

BLM. Bureau of Land Management.

BMC. Branch of Mineral Classification.

BOGO. Branch of Oil and Gas Operations.

BOMO. Branch of Mining Operations.

BWC. Branch of Waterpower Classification.

Cadastral survey. The establishment of land boundaries and their identification on the ground by monuments or marks and their identification in the records by field notes and plats.

CFR. Code of Federal Regulations.

Classification. Designation and/or withdrawal of public lands as being valuable or suitable, for specific purposes, uses, or resources.

As used in BWC, Geological Survey classifications for water storage and waterpower purposes designate Federal land as being valuable, or eminently suitable, for power or reservoir sites. These classifications neither commit the Government to construction nor prohibit private use for water resource development; however, they do serve to identify, protect, and forestall the encumbrance of potential sites. Classification as a potential water development site does not constitute a "withdrawal" in the usual sense of the word--the land may continue to be entered for other uses but with the understanding that water development

Classification (Con.)

cannot be precluded by such entry. Geological Survey classifications include Reservoir Sites under the Act of October 2, 1888 (25 Stat. 527); Power Site Reserves and Reservoir Site Reserves under the Act of June 25, 1910 (36 Stat. 847 as amended 37 Stat. 497); Waterpower Designations under the Acts of June 20, 1910 (36 Stat. 577, 564, 575), June 9, 1916 (39 Stat. 218), and February 26, 1919 (40 Stat. 1178, 1180); and Power Site Classification under the Organic Act of March 3, 1879 (20 Stat. 394). Geological Survey classification for power purposes come under the provisions of Section 24 of the Federal Power Act, and are subject to mining entry with power rights protected.

"Co-ops". Usually applications for alienation, such as homesteads or public sales, upon which the Survey is requested by BLM, through a cooperative agreement, to furnish mineral and water resources reports.

Designation. A powersite classification under the Acts of June 20, 1910, June 9, 1916, or February 26, 1919. (The Arizona and New Mexico Statehood Enabling Act and acts affecting revested Oregon and California Railroad and Coos Bay Wagon Road grants.) Also, the land so designated.

Director. The Director, Geological Survey, unless otherwise noted.

Disposition. A transaction which leads to the transfer of public lands, and/or resources in these lands, from the Federal Government.

Division Chief. The Chief, Conservation Division, Geological Survey, unless otherwise noted.

Entry. In general, an allowed application which was submitted by an applicant who seeks to acquire title to the land by payment of cash or its equivalent and/or by entering upon and improving the land.

Federal land. (Federally owned lands). All classes of land owned by the Federal Government.

Federal Power Act. (Formerly Federal Water Power Act). The Act of June 10, 1920 (41 Stat. 1063) as amended August 26, 1935 (49 Stat. 863; 16 U.S.C. 791a-823) creating the Federal Power Commission.

Federal Power Project Withdrawal. A withdrawal or reservation of Federal lands for use in connection with a hydroelectric power project under jurisdiction of the Federal Power Commission. The withdrawn land may continue to be entered for other uses, subject to prior power rights, and providing the project is not being actively pursued.

Filing. An application which has been submitted to the proper authority or official for processing or decision.

Geothermal resources. All fluid products of geothermal processes, embracing steam, naturally heated water and brines, and the heat or other energy associated with them and any by-products derived from them.

Historical index. A part of the new BLM public land records. A chronological list of all past and present actions affecting the use of, or title to, the public lands in a township.

Leasable minerals. On public land: coal, phosphate, sodium, potassium, oil and gas, oil shale, native asphalt, solid and semisolid bitumen, and bituminous rock, and sulphur (Louisiana and New Mexico). On acquired lands: all minerals except common varieties. On Indian lands: all minerals.

Legal description. As to any particular parcel of land, the description of its location according to the official plat of its cadastral survey.

Legal subdivision. In a general sense, a subdivision of a township, such as a section, quarter section, lot, etc., which is authorized under the public land laws; in a strict sense, a regular subdivision.

Locatable minerals. Those minerals other than the leasable minerals, usually of a metallic nature, subject to location under the mining laws, such as gold, silver, and copper.

Lot. A subdivision of a section which is not described as an aliquot part of a section, but which is described by a number. A lot is ordinarily irregular in shape and its acreage varies from that of a regular subdivision.

Master Title Plat. A part of the new BLM public land records, consisting of a map of a township at the scale of 30 chains to the inch showing what lands have been patented, patent number and any reservations of rights to the Government. All classifications and withdrawals, and locations of rights-of-way and land improvements are also shown. Mineral leases and permits are shown if only a few are present in the township; a Use Plat is added as part of the record if many are present.

Mineral lands. Public lands which have been designated as containing, or known to contain, valuable minerals.

Mineral Leasing Act. The Act of February 25, 1920 (41 Stat. 437; 30 U.S.C., sec. 181, et seq.) as amended and supplemented.

Mineral withdrawal for classification. A withdrawal of public lands which are potentially valuable for leasable minerals precluding the disposal of the lands except with a mineral reservation unless the lands are found, upon examination or by other competent evidence, not to contain a valuable deposit of mineral.

Minutes. Recorded summary of geologic data, history of executive action, and the development of conclusions affecting the classification of lands.

Modification. A formal order or notice permitting a specified non-injurious use of lands in a withdrawal or classification.

National Forest. A forest or watershed reservation which is administered by the Forest Service, U. S. Department of Agriculture.

Opening. An action which permits the submittal of applications for public lands that theretofore had not been available for acquisition under public-land laws.

O & C Lands. Public lands in western Oregon which were granted to the Oregon Central railroad companies (later the Oregon & California Railroad Company) to aid in the construction of railroads, but which were later forfeited and returned to the Federal Government by revestment of title. The term "O & C lands" as often used includes reference also to the reconveyed Coos Bay Military Wagon Road lands, which are public lands in western Oregon that were once granted to the State of Oregon to aid in the construction of the wagon road, but were later forfeited and returned to Federal ownership by reconveyance.

Original public domain. All the lands which the Federal Government obtained by cession from the Thirteen Original States (1789-1802), by the Louisiana Purchase (1803), by the cession from Spain (1819) by the occupation of the Oregon Territory (1846), by the Mexican Cession (1848), by the purchase from Texas (1850), by the Gadsden Purchase (1853), and by the purchase of Alaska (1867). The drainage basin of the Red River of the North, south of the 49th parallel and west of the cessions by the Thirteen Original States, is a part of the original public domain.

Organic Act. The Act approved March 3, 1879, which established the Geological Survey (20 Stat. 377;43 U.S.C. 31).

Patent. A document which conveys to the patentee legal title to public lands.

Posting, tract books. Notations on the tract books of an official action with respect to public lands.

Powersite. Land suitable for potential use as locations for dams, reservoirs, conduits, penstocks, transmission lines, and appurtenant works required for the generation of hydroelectric energy. The term "waterpower site" is used interchangeably.

Power Site Classification. See "Classification."

Power Site Reserve. See "Classification."

Proration. A system for allocating on a reasonable basis the amount of allowable production of oil and gas as between fields, pools, properties or wells to prevent waste and to protect correlative rights. In certain major producing states, the maximum allowable for a whole state is first determined on the basis of the reasonable market demand for the production within the state, and this allowabl is then allocated in such a manner as to prevent an oversupply of oil and gas.

Prospecting permit. A document which authorizes prospecting for certain minerals on public lands or acquired lands.

Protraction diagram. A diagram representing the plan of extension of the cadastral surveys over unsurveyed public lands, based upon computed values for the corner positions.

Public-land laws. The laws which have been passed by Congress concerning the administration of the public lands and resources thereon.

Public Land Order (PLO). An order effecting, modifying, or canceling a classification, withdrawal, or reservation, which has been issued by the Secretary of the Interior pursuant to statutory authority or the powers delegated to the Secretary by Executive Order No. 10355 of May 26, 1952 (17 F.R. 4831, 43 U.S.C. 141).

Public lands. Original public lands which have never left Federal ownership; also, lands in Federal ownership which were obtained by the Government in exchange for public lands or for timber on such lands; also, original public-domain lands which have reverted to Federal ownership through operations of the public-land laws.

Public Law 359. The Act of August 11, 1955 (69 Stat. 681) providing for the location of mining claims on lands classified, withdrawn, or reserved for power purposes.

Reclamation withdrawal. Public lands that are, or may be, needed in connection with the construction and maintenance of a Bureau of Reclamation project and withdrawn under the provisions of the Reclamation Act of June 17, 1902 (32 Stat. 388).

Regular subdivision. Generally speaking, a subdivision of a section which is an aliquot part of 640 acres, such as a half-section of 320 acres, a quarter-section of 160 acres, and a quarter-quarter section of 40 acres.

Reservation. A withdrawal, usually of a more or less permanent nature; also, any Federal lands which have been dedicated to a specific public purpose.

Reservoir Site. See "Classification."

Reservoir site. Land suitable for potential use or locations for dams, reservoirs, conduits, and appurtenant works required for water storage purposes other than for generation of hydroelectric energy. The term "water storage site" is used interchangeably.

Reservoir Site Reserves. See "Classification."

Restoration. A revocation of a withdrawal and the opening of the public lands involved.

Revocation. Generally, an action which cancels a previous official action; specifically, an action which cancels a classification or withdrawal.

Right-of-Way. A permit or an easement which authorizes the use of public lands for certain specified purposes, commonly for pipelines, roads, telephone and transmission lines; also, the lands covered by such an easement.

Secretariat. The body of presidentially-appointed officials in the Office of the Secretary of the Interior with delegated authority to act in behalf of the Secretary.

Secretary. The Secretary of the Interior unless otherwise noted.

Section 24. Section 24 of the Federal Power Act (41 Stat. 1075; 16 U.S.C. 818).

Segregation. Generally speaking, any action, such as withdrawal, allowed application, etc., which suspends the operation of the general public land laws as to particular public lands.

Valuable mineral. A deposit of a mineral ore or substance which is useful in commerce or the arts, occurring in quantity and quality sufficient to justify its mining and removal for sale; also, any quantity of such ore or substance in a vein or lode, the size and continuity of which are such as to justify an ordinary prudent man in the expenditure of his labor and means in an effort to develop a paying mine.

Valuable prospectively. A determination of potential mineral value of Federal lands. It is applied to those lands where geologic data suggests that the mineral may be present meeting classification standards.

Waterpower. A term used to designate any type of energy or power which can or has been developed through utilization of the energy in falling or moving water. The term "hydropower" is used interchangeably.

Water Power Designation. See "Classification."

Withdrawal. An action which restricts the disposal of public lands and which holds them for a specific public purpose; also public lands which have been dedicated to public purposes.

Serial register sheet. An official land office record containing the serial number assigned to an application filed under the public land laws and other pertinent information, such as the type of application, name and address of applicant, and the date of filing.

Smallest legal subdivision. For general purposes under the public-land laws, a quarter-quarter-section of 40 acres or a surveyed lot.

Status, land. With respect to any particular parcel of land, its legal description, its cadastral survey status (surveyed or unsurveyed), the non-Federal rights or privileges which attach to it or its resources, the withdrawals or special laws which apply to it, and other pertinent information which may influence the operation of public-land laws so far as its use or disposition is concerned.

Surface entry. An application for rights to land exclusive of the mineral rights.

Surface rights. Rights to land exclusive of mineral rights.

Tract books. The central records which show the status of the original public domain.

U.S.C. United States Code.

Definition: Public Land Classification Actions

Valuable mineral. A deposit of a mineral ore or substance which is useful in commerce or the arts, occurring in quantity and quality sufficient to justify its mining and removal for sale; also, any quantity of such ore or substance in a vein or lode, the size and continuity of which are such as to justify an ordinary prudent man in the expenditure of his labor and means in an effort to develop a paying mine.

Withdrawal. An action which restricts the disposal of public lands and which holds them for a specific public purpose; also public lands which have been dedicated to public purposes. The first step in the classification proceedure is the withdrawal of lands containing leasable minerals from entry, exchange or sale under the Withdrawal Act of 1910. Referred to as a mineral reserve.

Classification. Designation and/or withdrawal of public lands as being valuable or suitable, for specific purposes, uses, or resources. Classification actions may be formal and informal. The principal informal classification action is the delineation of lands valuable prospectively for the various leasable minerals. Formal classifications are made to determine which lands contain leasable minerals, in sufficient quantity and quality meeting minimum classification standards, and which lands are nonmineral.

Reserve. See withdrawal.

Restoration. A revocation of a withdrawal and the opening of the public lands involved.

Revocation. Generally, an action which cancels a previous official action; specifically, an action which cancels a classification or withdrawal.